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HOP CULTURE.

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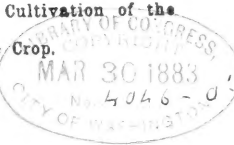
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Gardening for Young and Old.

—THE—

CULTIVATION OF GARDEN VEGETABLES in the FARM GARDEN



By **JOSEPH HARRIS, M.S.**,

Author of "Walks and Talks on the Farm," "Harris on the Pig," "Talks on Manures," etc.

The object of this work is to show how garden crops may be grown in field culture, and the teachings of Mr. Harris are mainly from his own experience, presented in that familiar style so well known to those who have read his other writings. We are sure that the work will be welcomed by a large class who are concerned over the problem, "How to make the farm pay." If his work is properly studied and its teachings followed, it cannot fail to be of great service, especially to the coming generation of young farmers, and may have much to do in "keeping boys on the farm." A small share of the work is devoted to the easily grown flowers, which will add to its value in the estimation of the mothers and sisters as well as of the boys.

CONTENTS.

Introduction.—An Old and a New Garden.—Gardening for Boys.—How to Begin.—Preparing the Soil.—Killing the Weeds.—About High Farming.—Competition in Crops.—The Manure Question.—The Implements Needed.—Starting Plants in the House or in the Hot-bed.—The Window-box.—Making the Hot-bed.—Cold Frames.—Insects.—The Use of Poisons.—The Care of Poisons.—The Cultivation of Vegetables in the Farm-Garden.—The Cultivation of Flowers.

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HOP CULTURE.

Hop culture, in recent years, has had its "up's and downs," its periods of prosperity and depression. The demand for hops continues to be sufficiently large and active to insure the production of a moderate supply, and occasionally of a large surplus stock. The European demand for American-grown hops usually fluctuates just in proportion to the quality or amount of the home-grown article in Great Britain, and when the hop crop fails there, as during the past year, there follows an increased demand upon the hop plantations of America. Whenever the crop is heavy and prices rule low for two or three years in succession, our hop-growers are very likely to become discouraged, and many abandon their culture. This fickleness is a national characteristic, confined to no one class or pursuit; the agriculturist probably practices it more frequently, and changes his plans oftener than those engaged in other industries. Those who destroyed their hop plantations a few years ago in consequence of bountiful crops and low prices, have probably regretted their haste during the past season, when hops have commanded higher prices than ever before known in this country. The lesson, however, comes too late for those who had gone out of the business, but the high prices were more gratifying to those who had remained in it even during years of depression. That hops will always be in demand is quite certain, unless some substitute for malt liquors should be discovered, which is not at all probable.

As our population is increasing, the inference is that more hops will be used in the future than have been in the past. Where this increased supply is to come from is a question worthy of consideration. Heretofore the principal source of supply has been a few counties

in New York and Wisconsin, with more or less scattered plantations in intermediate localities. As the population increases in these States and Territories near the "back bone" of the continent, it is quite natural to suppose that hop-culture will move westward, and already the residents in the fertile valleys and canyons of the Rocky Mountains are seriously discussing the subject, with the intention of soon starting extensive plantations of hops, where they are now unknown.

That the climate and soil of these regions are adapted to the growth of the hop, is shown in the abundance of wild plants found in the canyons and along the banks of almost every small stream, especially in the elevated regions where the climate is cool.

During last season (1882) the writer gathered as fine hops from wild plants in New Mexico as one would wish even in a cultivated plantation, and there is little doubt that cultivation would have the effect to further increase the productiveness and size of the strobiles. Furthermore, seedlings might be raised from these wild plants which would be better adapted to the climate and soil than those varieties now cultivated in our Eastern States.

Very little has been done in this country in attempting to raise new and superior varieties, a branch of hop-culture deserving of more attention. In Great Britain, experiments in raising plants from seed have been attended with surprising results, for in some instances seedlings well intermixed with a good supply of male plants gave hops with considerable increased weight per bushel, and larger and more pungent grains of lupuline. It is reasonable to suppose that hop-plants, raised in the usual way from cuttings for a series of years, or successive

generations, would become much enfeebled, especially if propagated from weak and neglected plantations, and that some method of restoring health and vigor would be necessary. The experiments of European hop-growers have shown that seed gathered from vigorous plants, gave even better results than cuttings from the same, and while the tendency to vary was but slight, still an occasional new sort was produced. The hop-growers of the United States should look to this matter, especially if the diseases of the hop-plant continue to increase or become more prevalent than in years past.

In all of the Rocky Mountain region some attention will be required in supplying the plants with water by artificial means, and while irrigation may not be needed every season, still it will be well to provide for it, to be employed whenever it becomes necessary. Where rains are insufficient to supply the moisture necessary for the plants, artificial irrigation must be given. This may be considered an advantage instead of a disadvantage, because the grower can so gauge the amount of moisture supplied to the roots as to promote growth or retard it

at his pleasure, and not be at the mercy of ever-changing and often unfavorable weather. In the arid regions dry weather can always be depended upon for gathering the crop, giving the farmer an advantage over Eastern and European hop-growers, who frequently have to contend with weeks of warm, murky, or rainy weather, during the harvesting of their hops. It is also probable that some of the diseases of hops—rust and mildew—will not prevail in such dry climates, and that the insects which infest the hop-plant near the sea level, would not be very likely to thrive at an elevation of five or six thousand feet above it, especially where great aridity accompanied high altitude.

It is true, that indigenous insects might, in time, acquire a taste for hops and do as much injury as the old and well-known enemies, but of this we can only learn by experience. That the soil of the valleys of the high cool regions of the West is well adapted to the growth of the hop-plant there can be no doubt, and its fertility is practically inexhaustible, especially when irrigated from the creeks and rivulets of those regions.

DESCRIPTION, HISTORY, AND USES OF HOPS.

THE hop-plant grows wild in Europe, Asia, and North-America; and, though cultivation has produced several varieties, there is but one species, *Humulus Lupulus*. The plant has a perennial root, and a twining stem which dies down to the ground every year, but remains alive below the surface, where there are numerous strong buds to supply vines another year. The vine, which twines from right to left, is somewhat angled and rough. The leaves are opposite, but sometimes alternate on the upper branches, and on long and

pistillate or female ones, though sometimes the pistillate plants, according to the investigations of Dr. Royle, produce a few staminate flowers. The staminate flowers are produced in loose clusters, like those in Fig. 1; they are of a yellowish green color, with a five-pointed calyx and five stamens. The pistillate flowers are borne at the base of scales which are arranged in close clusters on a short stem; these clusters, when ripe, form the product known as hops. When in blossom, the young hop will be found to be a collection of



Fig. 1. BRANCH OF STAMINATE HOP-VINE.

Reduced in size, and showing at the lower left-hand side a single flower of the natural size.

often twining foot-stalks. The larger leaves are three to five-lobed, while the smaller are more or less heart-shaped, and all are rough. The flowers are very numerous; the staminate or male flowers are usually produced on different plants from the

(3)



Fig. 2. BRANCH OF A PISTILLATE HOP-VINE.
(Shown in reduced size.)

very simple flowers, each consisting of a single pistil surrounded by a sort of membranous covering, and one of these is placed at the base of a small scale, which, as the hop ripens, increases very much in size, and becomes the most conspicuous part of the cluster of fruit, Fig. 2. The

fruit, botanically speaking, is the ripened pistil, which is a small nut which incloses a single seed. Upon the inner side of the scales, and around the fruit, are found numerous yellow grains which are peculiar glands; and, though they are produced only in the pistillate plant, they are often incorrectly called the pollen. These grains are called *Lupulin*, and sometimes "lupulinic glands" and "flour of the hop." When highly magnified, the grains of lupulin appear as in Fig. 3. When

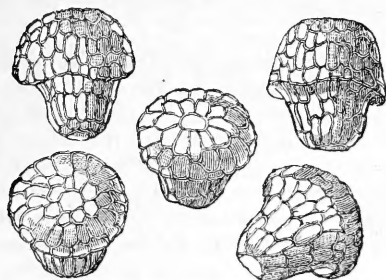


Fig. 3. GRAINS OF LUPULIN, HIGHLY MAGNIFIED.

fresh, the lupulin is very resinous, adhesive, and aromatic; and it is upon this that the peculiar odor, taste, and other properties of the hop in a great measure depend. This being the case, the greater or less abundance of lupulin in a sample of hops, is one guide in judging of their quality, and it will be seen that, in all the processes of preparing them for market, care should be taken that this be not lost. The lupulin varies from one-tenth to one-sixth of the weight of the hops.

The bitter, aromatic taste of hops is well known, and, like other vegetable bitters, they have a tonic effect upon the system, and are used in medicine. Beside being a tonic, hops have also a sedative action; and they, or preferably the lupulin, are frequently prescribed by physicians in derangements of the digestive organs attended by nervous excitability. A narcotic property has long been ascribed to the odor of hops, and it is stated that the air of buildings in which large quantities of them are stored, has the power of inducing sleep. Though this property of hops is denied by some medical men, others consider that a pillow of hops is efficacious in overcoming wakefulness, a remedy which became popular from its alleged success in the insanity of George III. Lupulin is kept in drug-stores, and is used in the form of tincture, or it is made into pills by rubbing it up in a warm mortar. The great use of hops, however, is as an addition to ale and other

for the purpose of flavoring them, as well as to preserve them from the acetous fermentation.

Hops have long been used in brewed drinks on the continent of Europe, and hop-grounds are mentioned in the ninth century in Germany. They are believed to have been introduced into England from Flanders in the reign of Henry VIII. Before this time, a bitter plant, called "ale-hoof," and others, were used in brewing. So great was the prejudice against the use of hops, when they were first introduced, that the city of London petitioned Henry VIII. to prohibit their use, "in regard they would spoil the taste of drink and endanger the people," and the King issued an injunction "not to put any hops or brimstone into the ale." The enormous consumption of hops at the present time in England, would show that the people of that country have outlived at least one prejudice.

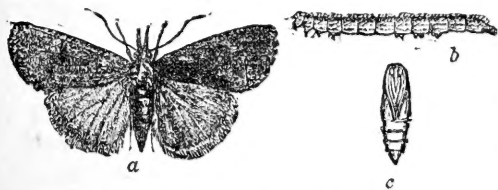
The young shoots of the hop-vine, especially in the beer countries of Europe, are esteemed as an article of food. The tender shoots are taken when they just appear above ground, and are cooked and eaten like asparagus or greens. We recollect a meal furnished us in Bavaria, at which the only drink was beer, while a good part of the food was the materials of which the beer was made: barley boiled and served as a vegetable, and the young sprouts of the hop, which seemed to be regarded as one of the delicacies of the spring season.

It is believed that the Essays, beginning p. 7, give full directions for the successful culture of hops. The essay taking the first prize advocates certain patented processes, and the Editors did not make the award without consulting those familiar with hop culture. They would acknowledge the valuable services rendered them in making their decisions, by the Hon. G. H. Andrews, Ex-Commissioner of Taxes. Mr. A. was formerly Editor of the *Hop-Growers' Journal*, and is thoroughly conversant with all that relates to hop culture. Those who prefer not to avail themselves of the patented processes, will find the ordinary methods of growing hops more fully treated and illustrated here than in any other work. After the prize articles, the essays are not arranged in any order indicating their relative merit, and each presents some details of practice different from the others. Scarcely any of the essays, except those to which the prizes were awarded, are printed in full, as it was necessary to condense them a great deal to avoid unnecessary repetition.

INJURIOUS INSECTS AND DISEASES.

The hop plant may not have quite as many insect enemies as some others, still it has a sufficient number to demand considerable vigilance on the part of the hop-grower.

THE HOP-VINE MOTH (*Hyppena humuli*, Harris).—This moth (fig. 43, *a*) measures about one inch and a quarter across the tips of the wings when fully expanded. The fore wings are marbled with gray, with a distinct oblique gray spot on the tip, crossed by wavy black lines, and there are similar lines on the hind wings, the general colors of which are lighter than those of the fore wings. These moths are the parents of small caterpillars, which at first are of a whitish color,* but change to green as they advance in age, when a pale green stripe appears along the back, and four black dots on the top of each segment, with a short hair growing from each dot. These caterpillars attain



THE HOP-VINE MOTH (*Hyppena humuli*, Harris).
a, moth; b, larva; c, moth.

their full growth in about two weeks, and are then a little more than an inch long (fig. 43, *b*). When mature they form loose silken cocoons among the old leaves or in cracks of the bark on the poles, in which the chrysalids (fig. 43, *c*) may be found. This insect is double-brooded, the first appearing early in June and the second in August or September. In some seasons it is so very abundant that the caterpillars strip the leaves of the vines, causing a failure of the crop, or at least on those plants attacked. Dusting the vines with poisons like Paris green would, of course, destroy the caterpillars, but at the same time be a dangerous remedy; consequently milder applications are to be recommended. Among the remedies suggested is freshly slaked lime or wood ashes, well sprin-

kled with carbolic acid, spirits of turpentine or gas-tar water, which, after drying, is to be dusted over the plants early in the morning while the leaves are wet with dew, or just after a shower.

HOP-VINE BUTTERFLIES.—There are several species of butterflies which frequent hop yards, and these caterpillars sometimes appear in such numbers as to entirely defoliate the plants. The most common of these butterflies is known to entomologists as the *Grapta interrogationis* of Doubleday—a handsome butterfly with deeply incised wings of a reddish color, silvery underneath. The caterpillars of this species not only attack the hop, but the leaves of the elm and basswood. They are an inch and a quarter long when fully grown, and the body black, thickly covered with streaks and dots of yellowish white; the second segment without spines, but with a row of yellowish tubercles in their place. *Thecla humuli*, Harris, also infests the hop vine, and the caterpillars are usually to be found in July and August. But from these larger insects, that can be readily seen and gathered by hand if necessary, the hop-grower has not so much to fear as from the smaller pests that are too minute to be destroyed in this way, or those that feed by night.

CUT-WORMS.—This is a general name for more than a dozen different species of insects. They are mostly long, grayish, or spotted, naked caterpillars which burrow just under the surface of the ground through the day and come out at night and cut off the young, tender shoots of various kinds of plants, including the hop. All these cut-worms are the larvæ of different species of night-flying moths, principally of the genus *Agrotis* and closely allied genera. It is somewhat difficult to destroy these pests, as both larvæ and perfect insect are nocturnal in habit, but much can be done towards ridding hop plantations by searching for the caterpillars around the crowns of the plants early in the morning, or late in the evening, while the caterpillars are resting from their work or about commencing it. Many birds, especially the crow and robin, scratch

out and destroy these caterpillars, as well as the "White Grub," which is the larvæ of the "Maybeetle." I use the name Maybeetle collectively for the fifty or more species of *Lachnostoma* which inhabit North America. The grubs of nearly all these pass under the general name of "White Grub." These grubs of the Maybeetles are several years in coming to maturity, while those of the caterpillars, known as cut-worms, reach maturity in a few weeks or months; consequently are in condition for doing mischief only for a short time, but they usually make up for it by being very industrious.

FLEA-BEETLES.—These are very small beetles with powerful legs, which enables them to jump like fleas, hence their common name. There is a large number of species, some so minute as to be scarcely visible without the aid of a glass; others are nearly or quite an eighth of an inch long and broad in proportion; some are jet black, others deep blue or brilliant green, and they are found in all parts of the United States, from the Atlantic to the Pacific, and even up to the regions of almost perpetual snow. They are divided into various genera by our coleopterists, and the species best known in our gardens is the *Graptodera chalybea*, or Steel-blue Flea-beetle. These flea-beetles sometimes attack the young hop shoots in early spring, boring small holes into them, or by eating the outside of the shoots cause them to curl and twist about instead of starting directly up the poles. For these pests Paris green may be used, as there will be no danger of its getting into the hops at this season, and

it will pass into the ground and become inert long before the hop plants come into bloom.

HOP-APHIS.—This is commonly known under the name of Hop-louse. It is a very minute insect, living by sucking the juices of the plant which it infests, and is often very injurious. It multiplies with great rapidity, and one generation succeeds another in a few hours or days at most, and when the weather is favorable the plants will soon be overrun and literally covered with the sucking pests. How to get rid of them is the principal question to engage the attention of the hop-grower. The usual preventive will be found named on another page, but I would suggest in addition the showering of the infected vines with a solution of carbolic acid—one part of the acid to one hundred of water; or even a weaker solution might answer.

RUST AND MILDEW.—These appear in unfavorable weather; extremes of heat and cold, moisture or draughts may cause the plants to be attacked by mildew and rust. The best preventives are good cultivation, good drainage and whatever tends to keep the plants healthy and growing vigorously. Weak, sickly plants invite the attacks of the various microscopic fungi, known under the general name of rust, smut, and mildew. Dusting the leaves and stems with sulphur is a well-known and often effective remedy, but in unfavorable seasons even sulphur often fails to produce any appreciable effect. It is always well to try such remedies, because they sometimes check the spread of disease if they do not entirely eradicate it.

THE PRIZE ESSAYS.*

NO. 1.—BY HEMAN C. COLLINS, MORRIS, OTSEGO COUNTY, N. Y.

FIRST PRIZE ESSAY.

VARIETIES.—There are many varieties of hops cultivated in this country, but English Cluster and Grape Hops succeed best. The Pompey Hop is very large, with long arms, but it is more injured by rust and insects than the first mentioned, on which the hops hang in large clusters, and both are early varieties.

SOIL AND SITUATION.—The situation for a hop-yard should be such that there is a free circulation of air—never by thick woods in a valley, for there rust, blight, mould, and lice most abound. They should have plenty of sunshine, which is the surest preventive for all these. The soil should be dry in winter, and have no water on the surface at any time. If not naturally rich enough, it can be made so by manuring. Any soil where good crops of corn or potatoes can be grown is suitable, but it should be easily worked and kept mellow, as there is much cultivation to be done. Where wheat will not grow, the soil must have lime, if hops are planted. In Central New-York they are raised on very high land, where none but the smaller varieties of corn will grow.

PLANTING.—The best time to plant a hop-yard is in the spring, as early as the ground can be worked. The ground should be plowed and made as fine and mellow as possible; then stake it off, and either mark it out with a plow or line it, and plant with a "dibble," which is the surest way to have the plants all live. Corn, potatoes, or any other hoed crop, can be raised the first year with the hops. Therows should never be less than eight feet apart, and on the rich bottom lands of the West, nine or ten feet is better. Make the hills the same distance apart both ways, and the rows perfectly straight. It is a great mistake to have the hills crowded, as they often are in some yards, to seven feet each way, or even less.

The sets for planting are runners from old vines, which can be had from any old yard.

Care must be taken to keep the sets from *male* plants separate from the others. The hop is a *diocious* plant, that is, having the staminate or male, and the pistillate or female flowers, on separate plants. There should be about one male hill to every eight hills, each way, or one in sixty-four, making from eight to twelve to the acre. These hills should be marked by a stake at planting, to enable one to distinguish them at a glance. The sets should be cut to two pairs of eyes each, (if very short-jointed, three pairs of eyes may be left,) and three to five of these should be put in a hill, according to the condition they are in. They are usually planted in a furrow made by a plow, which must be from two to four inches deep, according as the soil is light or heavy. If planted too deep, they will not come up well. Sets are usually sold by the bushel; two to three bushels for an acre. When yards are planted with good, fresh sets, and it is done early, there is very little risk of failure. Often large yards are planted without losing a single hill. When the ground is very mellow, with but few stones, dibble the holes just deep enough to let the sets be under the ground, and three or four inches apart; press the soil around them, and mark the place with a stick.

CULTIVATION THE FIRST YEAR.—The cultivation consists in keeping the weeds down and the ground mellow. One day's work in season is better than two later. If good sets are used, and they are planted very early, it will pay to raise a crop the first year, and the plants will be the better for it. Set one stake to each hill, and let *all* the vines run upon it. The stake should be but eight feet long, and set one foot in the ground; if longer than that, the vines will not get to the top in season to "*hop*" well. It is best to stake the plants, because then they are out of the way in cultivating the yard, and do not get torn off. We raise from two hundred to four hundred pounds to the acre the first year, at no cost, ex-

* Written in response to prizes offered by the Editors of the *American Agriculturist*.

cept picking and drying, besides the cultivation, which must be done even if none are raised. The stakes may be pieces of old hop-poles, or better, one and a quarter inch square sawed stuff, eight feet long, (there is one foot board measure in each stake.) It pays well to get gas-ar, which costs but one dollar or two dollars per barrel. Heat it in a pan made for the purpose, and dip the whole stake into it while it is hot. This makes a firm coat of paint on the stake, protects it from the weather, and at the same time is very offensive to insects, and plant-lice will not lay their eggs on it in the fall. In the autumn of the first year, a covering of two forkfuls of coarse manure should be given the hills, and if there is any chance of water standing on the surface, furrows must be plowed for surface drains, for it will kill the hills it covers. Cattle should never be pastured in hop-yards in the fall, especially not in young yards. There should be no grass for them to eat, though there too often is.

TRAINING.—Throughout the hop region of New-York, young trees have been cut, for many years, for use as hop-poles. This has gone on until the price has risen from two or three cents to twenty or thirty cents each, and large quantities are brought from Canada and the wilderness of Northern New-York, by canal and rail, and then drawn with teams to the yards, frequently from ten to twenty-five miles. Hard-wood poles last from two to five years, the best cedar poles but ten, and many poles break down with their load, or are broken down by the wind every year, which causes a total loss of the hops on them, and frequently on one or two adjoining poles. The common method allows two poles, eighteen to thirty feet long, to each hill. Being so long, the wind whips them, breaking off many of the arms, so that often a considerable part of the crop is destroyed in this way. When the crop grown upon the poles is picked, many hills are killed, and all are injured by bleeding of the vines, which must be cut off.

There is an improved method which has been practised in various hop-growing States, particularly in New York, and more especially in Otsego Co., where it has superseded the former modes of culture. This is "Collins's

Horizontal Hop-Yard." It was described in the *American Agriculturist* some years ago, and a section of the yard is shown in Fig. 4. I shall confine my directions for raising hops mostly to this plan, as I consider it as far superior to the common plan, with long poles, as the Mower and Horse-Rake are to the haying implements used by the last generation. There is but one stake

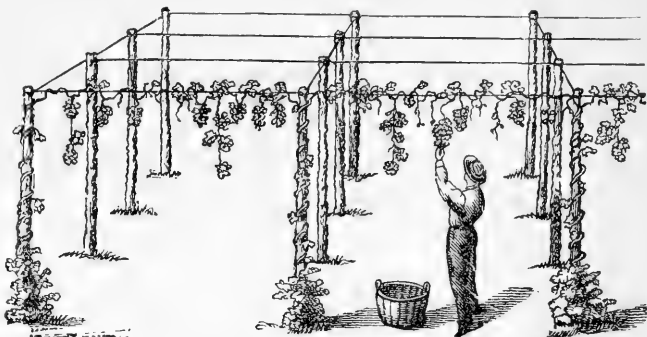


FIG 4. HORIZONTAL HOP-YARD.

to the hill, and this is eight or nine feet long, and set one foot in the ground. The best and cheapest stakes are one and a quarter inch square sticks, sawed at any saw-mill, left rough, and entirely coated with coal-tar. Where this plan is introduced into old yards, old poles, cut in two, are used; yet it is far better to use the square stuff above described, than to cut down a tree for each stake.

The outer row of stakes should be eight or ten feet outside of the outer row of vines, and where next a fence, put them on the line of it. These should be two and a half inches square, or if round, about as large as a common hop-pole, and set a little deeper than the others. For the inside hills, round stakes, an inch through, are as good as larger ones. The tops of all the stakes are connected by a twine running across the yard both ways—it is tied to the outer stakes only, and wound once around the inner ones. Use good twine—wool or broom twine, made out of hemp or linen. At the present price of twine, it is best to raise the flax and spin it, two or three threads making a small twine that will measure about seven hundred feet to the pound; this is strong enough, and lighter is often used, and if tarred with good pine tar it will last several years. Tarred hemp twine at present costs twenty-five to twenty-seven cents per pound at wholesale in New-York, and from thirty-five to forty cents through the country. A kind should be used that will not weigh more than twenty-five pounds

per acre; but I like best a good home-made twine, at about fifteen pounds per acre. The cost for twine is at present from six to ten dollars for an acre; but four years ago, it cost only three or four dollars.

At the male hills, put one tall pole, about eighteen feet long, so that the male vines will run up it, and the wind can blow the pollen over the yard. The string should pass these poles free, so that the wind will not break the twine.

The original cost of preparing this yard was as follows: 750 feet lumber for stakes, at \$15 a \$20; gas-tarring stakes, \$2; 25 pounds twine, at 30 cents, \$7.50; setting stakes, \$1; putting on twine, 50 cents; right per acre, \$10. Total cost after setting vines, \$36. Cost of yard with long poles: 1400 poles, 20 cents each, \$280; sharpening, \$10; setting, \$7. Total cost, (not counting hauling,) after setting vines, \$297.

SECOND YEAR.—In spring, the yard, as soon as dry enough to work, must be grubbed. Hoe the dirt from the hill without injuring the crown of the root. With a knife, cut off all the old vines smooth, and any runners that are seen. Never tear them off nor cut them with the hoe. At the same time examine whether there are any grubs in the hill, and kill all found. There are two kinds of grub—one which makes a beetle, with a dark, hard head, and white body, with legs all on the fore part of the body. It is always found doubled up like a horse-shoe. The other is a caterpillar which makes a butterfly. Both must be killed wherever found. Leave the hill nearly bare. If the stakes are in the yard, they must now be set, but if not, it is best to plow first. In setting, use a common light crowbar, and set about a foot deep, rather deeper for outside hills, and nearly twice as deep for the long pole at the male hill. Then plow out the yard, and after plowing, take out the runners or sets. These are only found in a yard after the second year, and if well saved, are worth from fifty cents to one dollar and a half per bushel. Break them as little as possible, and do not let them lie long in the sunshine, nor be frozen while out of the ground. In setting the stakes, all the holes should be on the same side of the hill, so that in plowing you can tell how to guide the horse, that he may not step on the crown. After taking out the sets, hoe the dirt back upon the hills, so that the ground will be nearly level, and put on the twine. When the stakes are but seven feet high, a man can easily put it on from the ground, but a boy or girl can do it with a light stool. The

twine is carried in a basket slung over the shoulder, out of the way. Never tie the twine except at the end stakes, and only wind once around the others, passing at the tall poles of the male hills. Have all stakes the same length. When the vines get up two or three feet high, they must be tied. Tie four to each stake, except in the outer row of hills, where five or six may be tied, so as to fill the strings to the outer row of stakes. Put the vines around the stake the way the sun goes, or they will not run, and tie with soft bass matting, or old woolen yarn.

Cultivate often, for it will save a great deal of hoeing. The five-toothed cultivator is best, but when the yard gets grassy, the plow is the only thing that will do the work. Never let the weeds get the upper hand. The vines will need tying up as often as any leave the pole, but it must never be done on a cold day, nor early in the morning, as then they will break, and whenever one has its head broken off, it must, if not up to the strings, be taken down, and another vine from the ground be put in its place. When the smallest vines have got a good start, three feet or more, bury the refuse vines at the foot of the stake with two inches of dirt, and never pull or cut them off, as is usually done. In a few days the leaves will rot, making manure, and the vines will make cheaper food for the grubs than those running up the stake. These vines throw out small roots, and help to make the crop for the year; besides, they are the best kind of sets for a new yard the next year. Mix air-slacked lime and unleached ashes, and put on about a pint to each hill; this will help to keep away grubs, and serve as manure.

When the tallest vines are up two feet above the tops of the stakes, go through the yard and lay them on the strings, winding them loosely once or twice around. Put the vines on the strings, while they are growing very fast, about twice a week, or when they are two or three feet long, letting them hang down six inches. When the vine has passed the first space, let it run past the stake, on to the string having fewest vines on it, and when it gets to the middle of the second string let it hang down like an arm. Sometimes I have seen vines stopped when at the second stake, but I do not like the way so well as to let them run further.

Never put the arms upon the strings, but let them hang down or wind into each other; they will not break by hanging, and will be more exposed to sunshine and air. When they are so

long as to brush the ground, lay them up on others, winding once around, and they will stay. If the vines have been so planted that the male vines can not be told, let them run up on the strings, but mark them in the fall, so as to put in a tall pole, for, if grown in this way, the pollen will be better distributed.

PICKING.—The hop is ripe when, on opening it, the seed is hard and of a purple color. After that, they turn brown, and the seeds drop out, and there is a great loss both in quality and weight. Of course, in a large yard, all the hops can not be picked at exactly the right time. If the yard is a large one, the hops will be ripe sooner in some parts of it than in others, and should be picked first, and, indeed, some must be picked rather too early, in order that none may be left much too long. Commence when the seed begins to get hard, and but few are yet purple. In horizontal yards this is about a week earlier than where long poles are used, and as there is no cutting off of vines, they do not bleed as in the old way.

At first do not hurry up the picking too fast, as while the hops are rather green the kilns must not be filled more than ten or twelve inches deep, and it takes longer to dry them than those that are riper. After a few days, when the hops are fully ripe, it is best to get one half more pickers than at first, as on a good kiln the hops can be dried from sixteen to twenty-four inches deep, and two kilns full can be dried in a day.

Those conditions of the air which produce rust in wheat seem to have the same effect on hops. It sometimes comes on very soon after a warm shower. High land is most free from rust; the worst place is a deep narrow valley near a stream, and sheltered by woods.

Hops can be picked from the strings, either in the common way with boxes and box-tenders, or by girls with baskets, without help. I like the latter way best, as it saves three fourths of the time usually spent in tending box, and the hops are picked cleaner and faster. I will describe both ways: First, with light willow baskets, which will hold three or four bushels, commence at the ripest part of the yard; loosen the strings from the stakes, and let them drop until held by the vines; they will then be about five feet high, and can be pulled lower as wanted. A large girl, or a man, can take the strings off the stakes.

Pick clean. Put the fingers through between the hops in the bunch, instead of around it and stripping, as is often done. Put in all the hops,

but none of the large leaves, and as few of the small ones as possible. Often there is no care taken to keep out small leaves, but for a prime article very few should go in, and no bunches of more than three hops should ever be allowed in the basket.

The owner, or some very careful man, should empty the baskets into sacks as they are filled, and see that all are picked well. Where any are found with bunches of hops, or any large leaves, the picker should sort them and pick them all out. For this the most careful man is required, and every careless girl in the yard will abuse him as much as she can. Good pickers will gather twenty-five to thirty bushels per day well, but wages should be based on about fifteen bushels for a day's work, as many girls will not pick more than that.

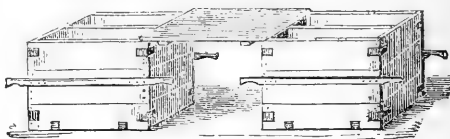


FIG. 5. "SET" FOR FOUR PICKERS.

Sacks for carrying the hops to the kiln should hold about ten or twelve bushels without packing, as the hops, if pressed in, will soon heat and turn black. The bags must never be left full of hops over night. Burlaps make good cheap sacks, and once made they last for many years. The vines are left on the strings, so as to mature the root for another crop, until they are killed by the frost; then it is best to take them down, strip them off the strings, and burn them. In this way the eggs of the plant-lice are mostly destroyed. Where the picking is done with boxes these are made of various sizes; sixteen thousand eight hundred and seventy-two cubic inches is the size required by a bill once proposed in the Legislature of New-York, but the bill did not pass. The boxes, usually holding from seven to ten bushels, are made about three feet long, with a partition through the middle, and two of these double boxes, with a platform three feet square between them, make a "set" for four pickers. They are of half-inch basswood, with handles at each end. A man (or a girl) called a "box-tender," who has a large basket, knife, and light stool, pulls off the arms from the vines, (they break out easily by a pull toward the root of the vine,) and with the knife cuts off the end of the main vine, which hangs down. As fast as he fills his basket he empties it on the platform,

thus leaving the main vine with most of its foliage entire, and preventing injurious bleeding.

When the hops are good, and the strings not more than seven feet high, one man can tend two sets of pickers, eight boxes, as easy as he can one where they are nine feet high. The man who tends box should never be required to sack the hops. Broken arms are to be thrown away when the hops on them have turned brown; for, if put in, they will injure the sale of all. A man who has the reputation of picking his hops clean, and putting them up nicely, will get a little extra price for

them, and find quicker sale when hops are low. The difference between "fancy" hops and "common sorts" is always enough to pay the whole cost of raising the crop. Only the best hops have the advantage of a foreign market. The price for picking varies from twenty to fifty cents per box. Owners usually board the pickers, and if they are treated well, they will find it all the easier to engage them another year.

is usually divided into four rooms. The stove-room, where fire is made, should be not less than fourteen feet high, and sixteen or eighteen feet is better, with stone or brick walls, and no floor; if the walls are of wood,

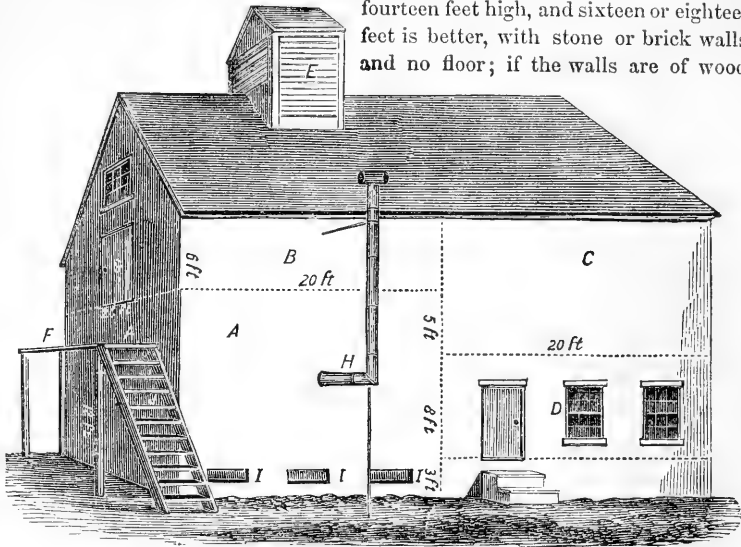


FIG. 6. ELEVATION OF THE COMMON HOP-KILN.

A, stove-room, with stone, brick, or plastered walls, but no floor; *B*, drying-room; *C*, store room, which has a window in the end, not shown, with tight shutters; *E*, ventilator; *F*, platform from which to pass up the bags of green hops; *G*, door into drying-room; *H*, pipe, or smoke-stack from stove, which is to be taken down when not in use; *I*, air-holes; *J*, stairs to platform. The usual dimensions are marked on the diagram, but these may be altered to suit the size of the yard.

they must be plastered to the top of the room. At the bottom of the walls there should be six air-holes, one by three feet, with doors to close them tight when necessary; and if the kiln is very large, there must be more than six. The stoves, usually two, are large enough to take in three-feet wood, with grate-bars at the bottom, and very large doors; the pipes are carried once or twice across the room, as near the level of the top of the stove as possible, and then go into a

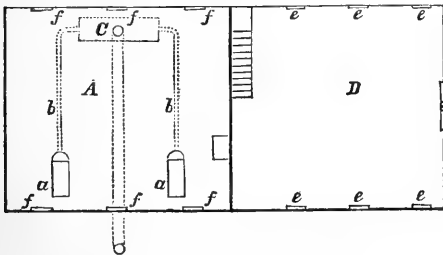


FIG. 7. GROUND PLAN OF HOP-KILN.

A, stove-room; *a a*, stoves, with grate-bars at bottom to allow the ashes to fall upon the ground; *b b*, pipe; *C*, sheet-iron drum; *f f*, air-holes in stove-room; *D*, baling-room; *e e*, windows to baling-room; stairs are shown going from the baling-room to the drying-room above.

DRYING THE HOPS.—The kiln should be proportioned to the amount of hops to be dried. It

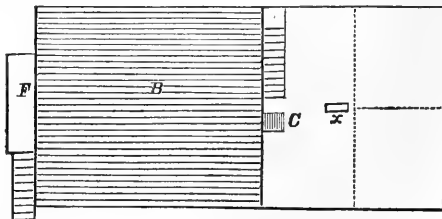


FIG. 8. SECOND FLOOR OF HOP-KILN.

B, drying-floor, with slats one by two and a half inches, set on edge, and supported by joists two and a half feet apart, running across above the stove-room, and covered by carpet; *C*, stove-room; *x*, trap through which to pass down hops in baling.

chimney on the outside of the building. Great care must be taken not to have the pipes touch

the wood-work, as it is kept so hot for a long time as to set fire to any wood-work near it. The pipe is often run several feet from the building and turned up like the smoke-stack of a steam-boiler, to make a good draft. There is a door from the stove-room into the baling-room, with a light of glass, so that the man who attends the drying may see the state of the fires without going in; a thermometer on the inside shows the degree of heat at a glance.

The drying-room is over the stove-room. Usually there are joists laid across the top of the stove-room, and wooden slats, one inch by two, are laid on them on edge, two and a half inches apart. On this there is laid a carpet—usually made of flax or hemp, with small threads, twisted hard and woven loosely, so that the spaces between them are about one sixteenth of an inch or more, allowing air to pass through it freely. It should never be of cotton.

tight by a nut on the end. The hops are put on it from a movable walk—a plank two and a half feet above the carpet, supported from the rafters by wire suspension-rods—and when the hops are on, the plank is turned on edge. When the hops are dry, the carpet is rolled off by a shaft in the store-room, so that all the hops are taken off in less than five minutes, and the carpet put back ready for a new charge, without losing the heat or letting the fires go down. No sweeping is needed with this kiln, nor does any one step on the carpet.

The roof should be carried up very high, so as to have the ventilator as high as possible, and make a better draft to the kiln. This is made with a cowl which turns by the wind, or a slat-ventilator is used, arranged so as to keep out the rain, while the air can pass up freely.

The store-room is next the drying-room, but the floor is from three to eight feet lower than

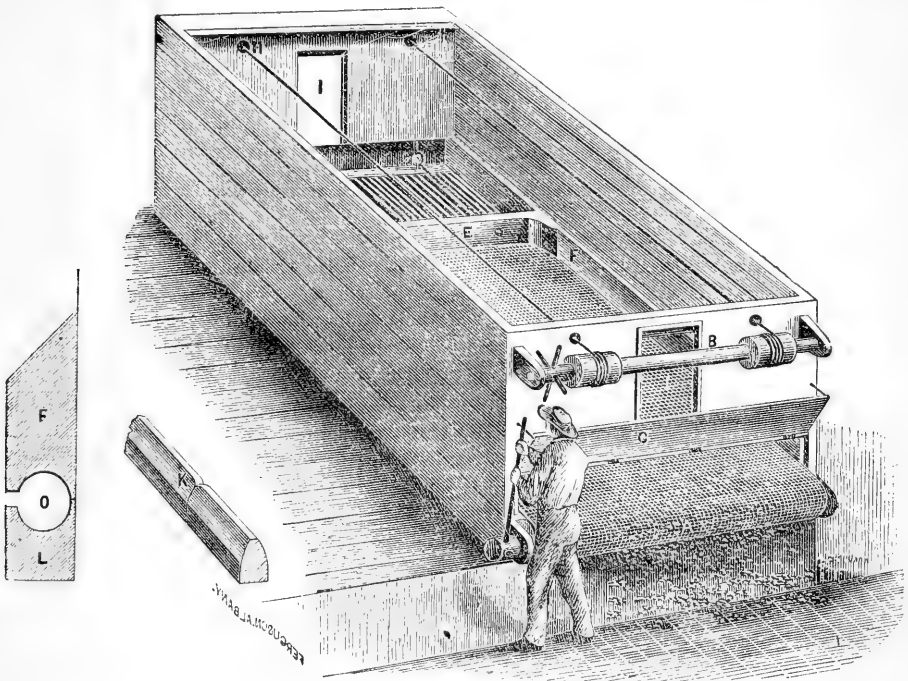


FIG. 9. THE FRANCE KILN.

I, the door to receive the green hops; *E*, the movable carpet, which is represented as being rolled up by a windlass in the store-room through the opening covered by the lifting shutter *C*; *B*, a windlass for drawing the carpet back by means of the ropes *II II*. The small figures at the left show the form of the slats and opening for the passage of the ropes.

The best kiln I have ever seen is one which has a movable carpet, invented by Edward France. Wires, like telegraph-wires, put three or four inches apart, are used instead of slats, and no joists are used, but the wires are stretched

the carpet, so as to make plenty of room to store hops in bulk until they are ready to press. It should have but one window, which should have a shutter to keep the room dark while the hops are in it. They will turn brown if exposed to

light. Have boards to set up, and make the end of the store-room farthest from the drying-room into one or two large bins, so that any damaged must wear shoes without nails, or he will tear the carpet.

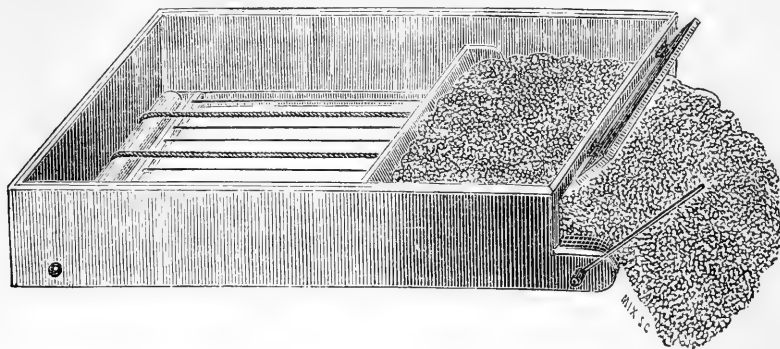


FIG. 10. THE FRANCE KILN IMPROVED.

This represents the floor of the kiln with a different method for moving it. Two cylinders are placed, one at each end of the drying-room; the ropes pass over the one farthest from the store-room, and are attached to both ends of the carpet. By revolving the cylinder in the store-room, the carpet is moved at pleasure. In this plan, wires are used instead of slats.

hops can be kept separate. Under the store-room is the baling-room; it has a tight floor, and is used to bale the hops, store the hop-press, together with any tools not in use in the yard.

At first picking put on the hops not more than twelve inches deep, and start the fires. Use only dry wood, as more heat can be had from dry than green wood, and where the stoves are large, the fires last better if large wood is used. Open all the air-holes, so there will be a good draft through the hops. When the fire is first made, the steam passes off from the hops very fast. Keep the temperature as regular as possible. About one hundred and eighty degrees, or as near that as may be, with as good a current of air as you can get, will dry them rapidly. After making the second fire, take a pan of coals from the stove, and put on a quantity of sulphur. If the hops are nice, and free from rust or mould, one pound is enough for bleaching a kiln, but when very rusty, from two to five pounds are sometimes used. Put the pan in the center of the room, and shut the door. The fire must be well made, for it can not be mended for half an hour. When half the stems will break on bending them the hops are dry enough. This will be in from eight to ten hours.

In using the common kiln, the doors are thrown open, the fire goes down, and the kiln is cooled for two hours, so that a man can go in to shovel off the hops, which he can not do while it is hot. With a rake, shovel and broom, he throws the hops off upon the cooling floor of the

Much of the flour, or lupulin, always falls through into the stove-room—sometimes two or three pounds from each kiln full. What falls on the stoves and pipe must be brushed off, or it will smoke the next charge. With the France kiln there is no sweeping. The hops are taken off when first dry, no flour falls through, and the hops are left whole; the next charge of hops is put on, and the heat is mostly saved, the fires not being allowed to go down at all. Two men have charge of the drying, where the kiln is run all the time, each working half the time. The hops should be left on the cooling floor, where they are thrown, until the next charge is nearly done; they are then shoved back a little, to make room for more, and so on until they get into the bins at the end of the room; two or three charges being in this way kept spread as much as possible all the time.

When the hops have been neglected by the dryer going to sleep, or any other cause, they become too dry, which is known by their feeling harsh, and most of the stems snapping. Shut the air-holes, put a quart or so of salt upon a pan of coals in the stove-room, and let the charge stand a short time—this will toughen them. It is best to have pickers enough to keep the kiln running all the time. Be careful to get hops dry enough.

BALING AND PRESSING.—The baling should be done in from four to six weeks; we usually take a rainy time when nothing else can be done, as then hops handle best.

The Harris Press is the best I have ever seen for baling hops; it is made by Seneca Gifford, Waterville, Oneida county, New-York. It is cheap and good, costing now but fifty dollars. Baling cloth is made on purpose for hops. A good quality should weigh about one and one half pounds per yard. Never use Gunny-cloth nor Burlaps. Twine for sewing should be small, strong, and free from bunches, so as to sew easily; the needles used are common bent sail-needles. A dozen pointed iron skewers are wanted to hold the cloth while sewing. Use tallow instead of wax upon the thread, so that it will slip easily.

Cut the sacking for the bottom piece one yard longer than the bottom of the press, and the upper one six inches shorter; save one piece of each kind until the last bale, for a measure, so as to have them all uniform. When a nice hop is grown, it should be kept as whole as possible. Have side-boards to fit in from the top of the press to a trap-door in the floor of the store-room,

corners of the bale full, so as to make a square, handsome package. Bales are all the same size.

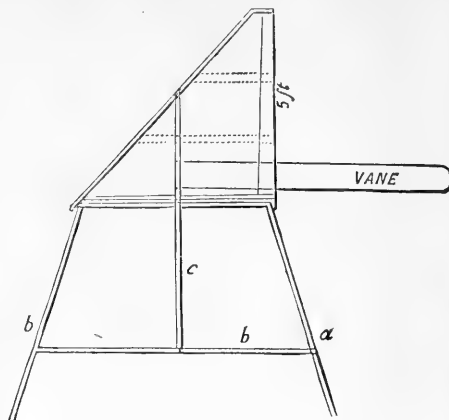


FIG 12. SECTION OF COWL TO DRAFT-KILN.

a, continuation of roof. *b*, 3x5 joist framed into rafters of roof. *c*, post, 3x3, framed into cowl, and movable upon an iron pin at bottom, which rests on *b*. The cowl shuts over the termination of the roof, and projects over it about two inches.

weighing from one hundred and fifty to two hundred and forty pounds, according to the degree they are pressed and how well seeded they are. The baled hops, if kept stored long, must be, in a dry room, set on end, and a few inches apart, so that the air can circulate between them.

[An engraving and description of this press will be found at the end of the book.—Eds.]

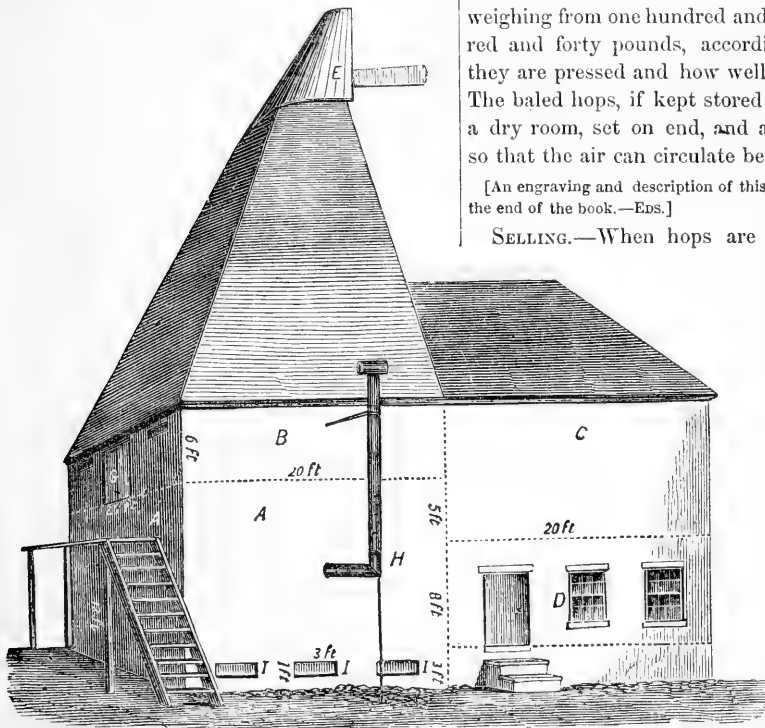


FIG. 11. DRAFT HOP-KILN.

The figures give the dimensions, and the letters indicate the same parts as in Figure 6.

and a wooden box there of the same size to shove them into. The side-boards to come out when the hops are below them. Take care to fill the

should be. It varies from eight cents, at the lowest, up to fifty or sixty cents, and even a dollar, for fine qualities; but the average for the

SELLING.—When hops are high, almost any will sell; but when they are low, only the best sell readily. At two years old they are worth but half price, and are worthless at four or five years. Always sell the first year. By keeping the run of the market, both in this country and Europe, the grower can form an intelligent opinion of what the price

last forty years has been seventeen to eighteen cents. The cost of raising in the manner described is from four to six cents per pound. The average crop all through the country is near one thousand pounds per acre, (when the work is well done,) but I have seen twenty-five hundred pounds per acre raised on a large yard. On two large yards in Morris, Otsego county, New-York, the average for four years past has been seventeen hundred on one, and eighteen hundred on the other, being both trained on strings.

INSECTS.—For two years past, the hop crop has been very much injured, even ruined in some places, in New-York, by the Hop Louse. This comes early in July, and unless prevented, it increases until it ruins the crop. I insert, from Harris's *Insects Injurious to Vegetation* a part of the description: "The winged plant-lice provide for a succession of their race by stocking the plant with eggs in the autumn; these are hatched in due time in the spring, and the young lice immediately begin to pump up sap from the tender leaves and shoots, increase in size, and in a short time come to maturity; in this state it is found that the brood, without a single exception, are females, which are wingless, but are in a condition to continue their kind immediately. Their young, however, are not hatched from eggs, but are produced alive; and each female may be the mother of fifteen or twenty young lice in a single day. The plant-lice of this second generation are also wingless females, which grow up and have their young in due season, and thus brood after brood is produced, even to the seventh generation or more, without the appearance or intervention of a single male through the whole season. This extraordinary kind of propagation ends in the autumn with the birth of a brood of males and females, which, in due time, acquire wings, and pair. Eggs are then laid by the females, and with the death of these winged individuals, which soon follows, the species becomes extinct for the season."

The bark of poles, and any old rubbish, vines, etc., in the hop-yard, will be covered with the eggs of these plant-lice. When sawed stakes are used, and coated with gas-tar, not an egg will be laid on them. The old vines should always be burned up in the fall.

The enemies of the louse are the Lady-bug, (*Coccinella*), while in the larva state. It is a small flattened grub, of a bluish color, usually spotted with red or yellow, and has six legs near

the fore part of the body; "they are hatched from yellow eggs laid among the lice in clusters." Another is the grub of a "golden-eyed, lace-winged fly;" "it is a long, slender grub, with a pair of large, curved, sharp teeth." Harris says it will kill one louse a minute. "Its eggs are on short hairs among the lice." "Small two-winged flies, black, with yellow bands, lay their eggs among the lice; they make maggots which destroy large numbers."

By taking care to save what are found of these, I think the lice will be kept down so as not to ruin yards, as is done in some cases now. Every hop-grower should have Harris's book. The insects which prey on his crops are described there, with some hints toward their extermination. Ants should be kept out of the yard as much as possible; they are said to take care of the lice, while they are few, and transport them to vines where there are none. Drive away, by coal-oil or gas-tar put on their hills. After the first year, lady-bugs and other enemies of the lice increase so much as to save the yard from much damage. There are several caterpillars which live on the hop-vines, but I have never seen them plenty enough to do much damage, except the one which lives in the ground and eats the roots and the vine near the surface.

If the grower examines the hop-yard closely, he will soon learn to tell his enemies from his friends. Crows and other birds are of great use in eating beetles and grubs, and snakes also devour large numbers of them. Last spring, I found more than half the hills in our yard dug into by skunks, searching for the grubs, and where they had been I could find no grubs. The little harm they do in sucking eggs, is far more than made up by their work. A family of skunks will do as much toward taking out grubs, if you will protect them from the dogs, as a man can do. They work in the night. Barn-swallows were on our yard last summer all the time, and appeared to live there, going only from the barn to the yard, where they got their whole living.

MANURING.—Every fall the yard should have two forkfuls of coarse manure on top of the hills, partly as a protection to the vine, and from the first to the middle of July, it should have as much, or, if the ground is poor, more well-rotted, fine manure, which has been fermented enough to kill any seeds which were in it. This should be put on, and covered immediately with an inch or two of dirt; ashes are often mixed with the manure, but I prefer using them with lime on

the surface of the ground. I have seen plaster used with good effect. Old bones are good to bury in the yard, where any amount of them can be had. So also are the sweepings of blacksmiths' shops. In this country, hops are now mostly raised in Central New-York, some in New-England, and a few in the Western States. I have seen them growing wild in Iowa, Missouri,

and Kansas, fully as fine as the cultivated ones. They grow wild on all creek bottoms, where the soil is not overflowed in the winter, and where they are not killed by fire, producing best in those bottoms formed by the wash of limestone hills. The few yards which have been established in the States of Iowa and Wisconsin produce large crops of the best quality of hops.

NO. II.—BY "E. O. L.," VERNON, VERMONT.

SECOND PRIZE ESSAY.

SOIL AND PREPARATION.—Hops grow on almost every variety of soil, but for the best success, select such as produces the best crop of corn. Soil that is very wet in any season should be thoroughly underdrained. Very stony lands are objectionable, both on account of the difficulty in setting the poles, and the liability to injure the vines by the unsteady course of the plow or cultivator. The location of a hop-yard should, if possible, be sheltered from the prevailing winds, by a hill or a forest or a belt of trees. Inasmuch as the hop sends its roots deep into the soil, and as the same yard is usually kept bearing several years in succession, deep tilling and thorough enriching at the outset, are highly important. Old mowings, with a tough sward and stiff, clayey soils, should be plowed in autumn, either with a subsoiler or a double plow—one share simply turning the turf, and the other covering it with the remaining soil. In the spring, let the manure be applied as liberally as the supply will afford, and thoroughly incorporated with the soil by harrowing, first *with* the furrows, and then *crosswise*, preparing the ground as for corn.

KINDS AND PROPAGATION.—In this section, the Connecticut Valley, we have at least three distinct varieties of hops, characterized as follows: In the most common kind, both vines and fruit are of medium size; the hops have a mild flavor, and part very easily from the stems. Another kind is distinguished by its large, rank-growing, rough vines, dark green foliage, large, squarish, and strong-flavored fruit, sometimes three and even four inches in length, and hard to pick. The third variety is known by its red vines, fruit rather below the medium size, hard, of a golden color, and mild, agreeable flavor. The first of these is known in New-York market as the "grape" variety, and the second as the "Pompey" hop. There are no imported hops in this section that I know of. Hops may be propa-

gated from seed, but the best way is from root-stocks or underground runners, which are taken from yards one year or more old. When the hops are dressed out in the spring, these root-stocks are brought up by the plow or hook, and should be pulled up, as far as they can be easily, and cut off. Afterward they are collected and buried, so as to keep them fresh until wanted. When the ground is prepared for planting, the root-stocks are unburied, the bruised or decayed portions cut out, and the remainder cut into slips, containing at least two sets of buds; these should be sprinkled with water and kept moist until planted. About two barrels of root-stocks, as taken from the yard, will plant an acre. The root-stocks of the male or staminate hop should be kept by themselves. Four hills of the male hop to the acre are sufficient.

MARKING OUT AND PLANTING.—Having decided which way to set the poles, with a horse and light plow furrow for the rows, seven feet apart. Then furrow crosswise for the hills, seven and one half feet apart. For the sake of appearance, as well as for convenience, let the furrows be perfectly straight, and cross at right angles. Then furrow or mark for one row of corn (I prefer corn, though any hoed crop may be planted with hops,) each way between the hop rows. Drop one shovelful of well-rotted manure, or compost, and also manure for the accompanying crop at the same time, if it is to be treated in this way. As the manure should not be long exposed, let both hops and corn be planted as soon as possible after the manure is dropped. In planting hops, it is more convenient to work across the rows. With a hoe, mix the manure with the soil, and part it, so that the slips when covered shall be three or four inches below the level. Put four slips in a hill, lengthwise of the row, with part of the buds turning one way and part the other.

FIRST YEAR'S TREATMENT, AND PROCURING POLES.—At the first hoeing, care should be exercised with the hop-hills, lest the tender sprouts just coming up be cut or broken; pull out the weeds with the fingers. At the second hoeing, each hop-hill should contain one or more thrifty sprouts. It does not pay to set poles the first year, and no further care is needed than to keep the field free from weeds. In autumn, throw a shovelful of well-rotted manure upon each hill. This is the season, too, for cutting and preparing poles to stock the yard. Hemlock poles are the best we have here; but the supply is so nearly exhausted, that we have to use such as we can get; and pine, chestnut, and the various kinds of hard wood comprise a large part of our present supply. Some of my neighbors shave a strip of bark off from two sides of all except hemlock poles, and think it pays to do it. Poles should not be cut less than sixteen feet in length, and I should much prefer to have them twenty feet. Let them be closely trimmed and sharpened with a slim, true slant to about one inch square at the point. New poles are too heavy to hold with ease and sharpen at the same time, so we tie three poles together with a rope or small chain, raise them up and spread their lower ends to form a tripod, and lean the poles to be sharpened against the upper part of this pyramid while sharpening.

SETTING THE POLES.—This should be begun as soon as the frost is sufficiently out of the ground in the spring, as the holes can be more easily made then than when the ground is fully settled. A convenient bar for making the holes would be about four and a half feet long, made from an iron rod one inch in diameter. Fifteen inches from one end it should be enlarged and formed two and a quarter inches square, and gradually taper to a point, which should be steel. If the enlargement were polished, and the other end of the bar slightly enlarged, it would be found to work more easily. Make the holes deep enough to set the poles firmly. Set two poles in each hill, about fifteen inches apart and straight in the row; if they are crooked, let them bend *from* each other. No two poles should be so set as to touch, as they would either be tied together by the vines, or the vines would be injured by the rubbing of the poles together in the wind.

DRESSING OUT.—As soon after the poles are set as the ground is in good condition to work, with a horse and light plow go two or three times in a row crosswise, and three or four times in a row lengthwise, according to the amount of weeds

and grass in the field. Turn the soil *from* the hills with care, lest you plow too deep next to the hills and injure the roots. Then with the hop-hook, (Fig. 13,) or hoe, remove the manure and a portion of the dirt from the crown of the hill, taking care to destroy all weeds. In trimming, cut off all the root-stocks and save them for planting; they generally find a ready sale at one dollar per bushel. In old yards, cut off, with the old vines, as much of the root as is necessary to keep the hill down; but in new yards, cut only the old vines off above the sprouts.



FIG. 13. HOP-HOOK.

TRAINING UP THE VINES.—As soon as the vines are long enough, put them on to the poles so that their twining follows the sun, and keep them tied up until they are eight or ten feet high, when they will generally take care of themselves. It is well to look the yard over as often as once a week, and attend to the vines that may be off. When they are beyond one's reach, use a ladder similar to a fruit-ladder. Almost any kind of string will do to tie them up with, but I prefer cotton pack-thread or stocking yarn. Put the string around about four inches from the end of the vine, and twist the ends together, taking care not to pinch the vine. When each pole is stocked with two good vines, cut off all the rest close to the ground, then the field is ready for

HOING.—Use the plow the first time, turning two furrows crosswise and three lengthwise, this time *toward* the hills. In hoeing, the object is to loosen the soil and kill weeds. It was formerly the practice to hill hops, so that in a few years the hills would be from one to one and a half feet in height; but this was found not to be the best way. Our fields more frequently suffered from drouth and worms; they would not last so long, and it was harder and more disagreeable work to cultivate them. I prefer to keep the field very nearly flat. At the second and third hoeings, I use the common cultivator twice in a row one way and three times the other, taking care to run it very shallow next the hills. The third and last hoeing should be when the hops are in full bloom, generally about the 20th of July, unless the field is very weedy, in which case let it be hoed until the weeds are subdued. Just before hoeing I throw about a table-spoonful of plaster around the vines at the root, and this time make a *small* hill, all of which is removed in dressing

out. [The rule in New-York is never to touch hops while in blow. The hoeing is done before July 4th; if needed afterward, wait until the hops are set.—G. H. A.]

PICKING.—Hop-harvest generally begins here during the last week in August. We employ women at from thirty to fifty cents per day. Hops should be picked free from stems and leaves, except very small ones, and dried as soon as convenient. If kept too long, they will heat and turn black when dried. In picking, we use bins about 8 feet long, 2½ feet high, 3 feet wide at the top, and 2 at the bottom. The object in having

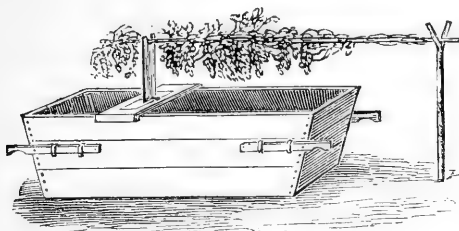


FIG. 14. PICKING-BIN.

the bins narrower at the bottom, is to render it more easy for the pickers to stand close to them. A board is fitted across the bin near one end, having a narrow cleat nailed upon each end of it, so as to hook on to the sides of the bin. Upon the center of this board is nailed another piece about a foot long and 4 inches wide, through which a mortice, 1×4 inches, is made to receive the standard—a piece of board 4 inches wide and 30 inches long, with a notch in one end for the poles to rest in. The standard is kept at the proper height by a pin, as seen in Figure 14. A crotched stake is set for the but-end of the pole to rest upon. At such a bin, three girls and a man can work to good advantage. The man pulls the poles, first cutting the vines two or three feet from

the ground, lays them upon the bin, helps pick, and throws them off in a pile. By taking four or six rows, and six hills in each row, we bring as many poles together at one place as is convenient. When the bins are too full for convenience in picking, the hops are shoveled into sacks, in which they are conveyed to the kiln.

DRYING.—In emptying the hops upon the kiln be careful not to step upon them, or crowd them down, for in that case they will not dry uniformly. Level them as evenly as possible with a rake, to assist which the side-boards may be marked around upon the inside at different heights, and then the hops can be leveled to the mark. A fire should be started in the stove ten or twelve hours before the first hops are put on, in order to get the stove-room and dry-room thoroughly warmed. As soon as the hops are put in, a brisk fire should be started, and kept up until they begin to be dried through, when less fire will answer until they are dry enough to take off, generally from 12 to 18 hours. I do not stir my hops until they are dry, or until I can find no hop within which the stem is not shrunk; then I shove them off into the store-room, either with a rake, or shovel made of thin boards. Fig. 15.



FIG. 15. SHOVEL.

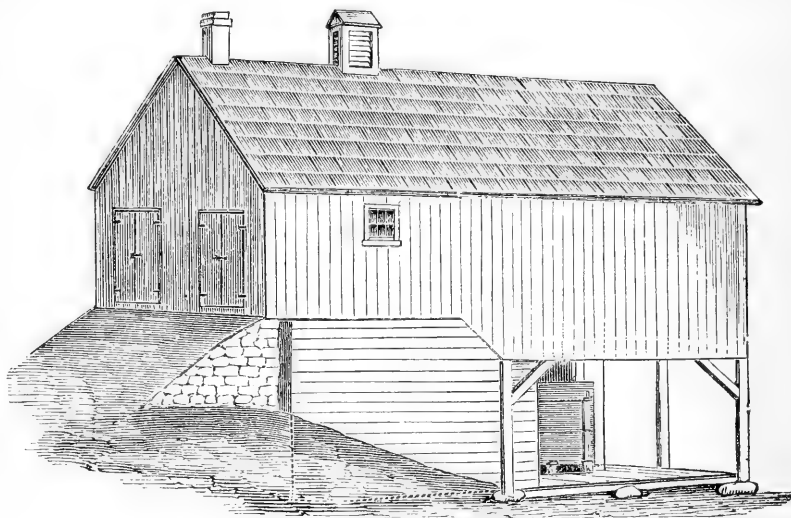


FIG. 16. ELEVATION OF HOP-HOUSE.

Fig. 16 gives an elevation, Fig. 17, a sectional view, and Fig. 18, a ground plan of a model hop-

house. The size given is large enough for a yard covered by joists, slats, and cloth. The dry- of four or five acres. It should be set in a side- room should be double boarded or lathed and plastered all around to the eaves, and next the store-room to the ridge. There should be a ventilator directly over the kiln. The store-room should be boarded on the inside next the dry-room, and a space left for cool air to pass up, as indicated by the arrows in Fig. 17. This prevents the hops in the store-room being dried continually by contact with the dry-room. A hole (H) is left in the floor of the store-room, in which a bottomless bag is fixed to conduct the hops into the box in pressing. The stove-room should be double boarded outside, and double boarded or lathed and plastered inside, and supplied with convenient air-holes at the bottom on all sides, which may be opened or be closed up at pleasure. The stove is made expressly for

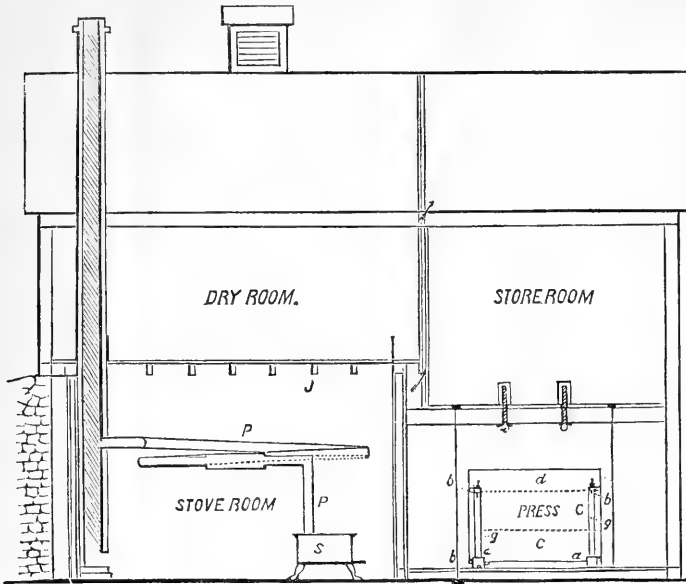


FIG. 17. SECTION OF HOP-HOUSE.

Showing stove, dry, store, and press rooms. *S*, stove. *P*, pipe. *C*, movable sides of press. *a*, upper plank of press. *g, g*, posts to support sides of press. *b, b*, iron rods, which connect the bed-sill with the strong beam above.

hill if possible, otherwise much hard labor would always be required to get the hops up to the kiln. at pleasure. The stove is made expressly for

The hop-house here described is 22 x 32 feet, with a kiln 16 feet by 16, and a walk entirely around it. The store-room is 12 x 22, and 2½ feet lower than the level of the kiln, which is eleven feet from the ground. The joists (*j, j*) over the stove-room are 2 x 7 inches, upon which rest the slats, (*s, s*) 1½ inches square and 4 inches apart. These support the strong linen strainer-cloth which is fastened to the side-boards of the kiln by small hooks. At the openings, where the hops are shoveled off, the cloth should be nailed down with small tacks. In Fig. 18, one corner of the kiln is shown partly

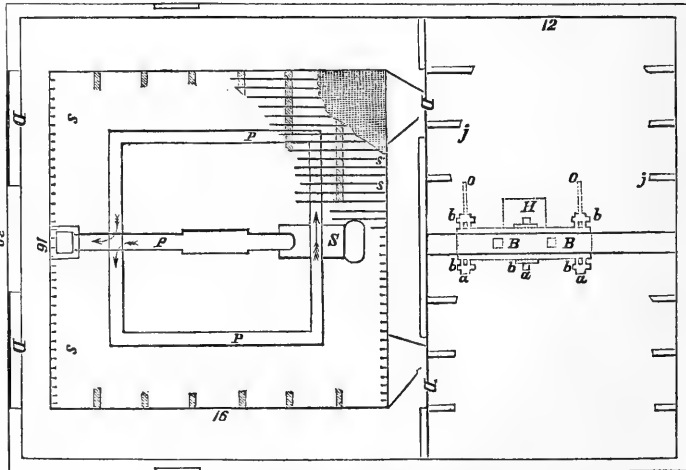


FIG. 18. GROUND PLAN OF HOP-HOUSE.

Showing the arrangement of stove and press-room. *S*, stove. *P*, pipe. *H*, trap-door in room above to let down hops to press. *B, B*, bottom of press. *b, b*, keys to hold the side posts of press. *o, o*, railway for moving press under the hole *H*. In this figure, the position of the joists, *j, j*, and slats, *s, s*, of the floor above are also shown.

drying hops. The bottom is simply a grate, so that the draft is directly under the fire, and con-

sequently greater. The pipe, (P,) which should be seven inches in diameter, rises from the stove to the height of five or six feet from the ground, then passes horizontally into a drum, 12 or 14 inches in diameter and 3 feet long, thence as indicated by the arrows in Fig. 18, rising gradually as seen in Fig. 17, until it reaches the chimney about four feet from the cloth. Such an arrangement of pipe keeps all the heat where it is needed, and of course saves fuel.

The press-room should be at least seven feet from the floor to the beam in which the screws are set. The beam, 10 x 12 inches, may also serve as a support for the floor of the store-room. The bed-sill is of similar dimensions, and connected with the beam by two half-inch iron rods seen in Fig. 17. In Fig. 18, B, is seen the bottom plank of the box, which is 17 $\frac{3}{4}$ inches wide and six feet long, and is pinned to the sills. The side planks (c, Fig. 17) are of the same length as the bottom, and two feet wide, grooved near the ends to receive the end pieces. The length of the box inside is five feet. The top plank, (d,) one foot wide, is held in place by the ends of the tenons on the posts *g*. The cloth used for baling hops is about 44 inches wide, and five yards is sufficient for a bale.

DIRECTIONS FOR USING THE PRESS.—First place three yards of cloth evenly upon the bottom plank; then two men, one on each side, take the lower side-plank and place it so as to smooth the cloth as it slips down at the edge of the bottom plank; put in the lower end-pieces, and then the posts, inserting the keys at the bottom to hold them until the rest is put up; put up the remaining sides and ends, and put on the cross-ties; then key it tightly, first seeing that it is square and plumb. They then put on the top planks, and the box is ready for the hops. Slide the box on the track, (o, Fig. 18,) until it is under the hole H. When filled, slide it back under the screws. Place the remaining two yards of cloth evenly upon the following plank, and put it upon the hops; put on another plank of about the same size and blocks enough to reach to the screws, saving room enough for a two-inch follower over the blocks. Then press down until the bale is about two feet thick. Drive out the keys, take down the box, sew up the bale neatly with strong hop-twine, then turn up the screws, and the work is done. The screws should be at least two inches in diameter and three feet long.

CARE OF POLES, ETC.—As soon as convenient after picking, the vines should be taken from the

poles and burned, and the poles either stacked or laid upon sticks to keep them entirely from the ground. A convenient scraper for taking off the vines is shown in Fig. 19; it consists of a two-inch plank 10 or 12 inches wide, and 8 or 10 feet long, having a block (with a large notch on top in which spikes are set, so as not to allow the pole to drop between them) pinned to it about six inches from one end. This end is upon legs, and the other end rests upon the ground.

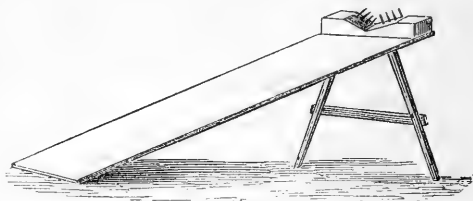


FIG. 19. SCRAPER FOR CLEANING THE POLES.

Hops should, *in no case*, be pressed and baled until they are entirely cool; and it is better to let them remain in the store-room ten or fifteen days. The fact that the first in market often sell the best, induces many to hurry the pressing of those first dry, oftentimes to their eventual loss, for unless dried to a powder, they will heat and turn brown if pressed too soon. To work at pressing to the best advantage, requires two men to tread them down, and another man or boy to shove them into the box. The bales should weigh about 200 lbs.

GENERAL REMARKS.—Most of the growers in this section send their hops to the New-York market to be sold by Commission Merchants. The price varies more than that of most other kinds of produce. Sometimes it is very remunerative, and at others not sufficient to half pay for raising. I have known farmers to begin the culture of hops when the prices were high, thinking to make fortunes rapidly, and on the decline of prices in a year or two, to plow up their yards and condemn the business. Such a course must result in loss, on account of the outlay in getting started. The best way is to persevere, when a good beginning is made, for high prices will rule at least *half* the time. When worms begin the work of destruction after the vines are on the poles, dig them out. It is best to dress-out such yards in the fall, because by leaving the roots more exposed the worms are killed by hard freezing. I use only the hook or hoe in dressing-out in the fall.

NO. III.—BY S. B. RYDER, COVENTRY, CT.

SELECTION OF AND PREPARATION OF SOIL.—The best land for hops is a deep, sandy loam; such land as will produce good corn is almost certain to produce good hops. After the selection of the ground, it should be deeply plowed in the fall, and again in the spring; then, after harrowing, it is ready for the roots.

SETTING.—Immediately after plowing, which should be done as early in spring as the ground is in condition to work, setting of the cuttings should commence, for the reason that those set early are surer to do well than those which are set later. Make the hills eight feet apart the short way, and seven feet apart the long way of the land. The hills should be in direct rows, both for ease in cultivating and for the symmetrical beauty of the yard. To secure this, it is best to commence marking the hills at the short side of the yard. Procure a cord as long as the width of the yard, and firmly attach to it, at the distance of every eight feet, a small piece of white or red cloth, omitting the cloth at each end of the cord, and attach in the place of it a strong stake, four feet in length, and well sharpened at the end. Firmly set these stakes at the corners of the short end of the land, tightly stretching the cord in doing so. The first row is now ready to stake, which is best done with cedar or pine stakes, about ten inches long, and setting them in the ground at each mark on the cord. Place a stake also at each end of the cord. From this first row of stakes measure off a space of seven feet, again stretch the line and proceed as before, until the yard is all staked. After the staking, take a basket containing cuttings, and a good spade, and begin at one corner. Take up the small stake, and with the spade make a hole about seven inches deep and ten inches wide. Take three cuttings in one hand, place them on end in the center of the hole, about three inches apart, and with the other hand lightly press some soft dirt around them, so as to keep them in place, and with the spade fill up the hole, slightly pressing on the top. The object of setting the roots on end, is that they may come up near together, making the hill as compact as possible, while if the roots are thrown carelessly into the hole, they might come up one or two feet from the hill, making them more difficult to train. After planting the roots, set the stake again in the center of the hill. The first year

corn may be planted on the same piece of ground; but if this is planted, it must not be within one foot of the hills, for if nearer, it will shade the young hops and much retard their growth. In the wide spaces away from the hops plant corn as usual. When cultivating this the first time, be very careful not to bruise the young hop-vines or otherwise injure them, but clear the hills of all weeds and loosen the dirt, treating them very much the same as the hills of corn. The better the vines are cultivated the first year, the heavier will be the first crop. It is best to remove the corn as soon as ripe enough, in order that the tender vines may, by the more direct effect of the sun, mature before the coming of the frost. When the frost has killed the vines in the autumn, take a sharp knife and go to each hill, cutting them off to the ground. Then cover each hill with soft loam to the depth of about three inches, spreading over this loam a light coat of manure. Let this remain until the ground thaws out the next spring, then spread it around the hills, and plow and cultivate both ways, without disturbing the roots. Five male hills are required to the acre; the best manner of placing them is to set one on each of the four sides and one in the middle of the yard.

SETTING THE POLES.—Almost any kind of wood, of the right size, can be used for poles. In selecting, be sure to get those which are of uniform size, about sixteen feet in length and from two to three inches in diameter. Sharpen the larger end, for a distance of about twelve inches, leaving a blunt point one and a quarter inch thick. In drawing them on to the lot, leave two at each hill, one on each side, and about one foot from it. After distributing the poles, make the holes for them with an iron bar. They should be directly opposite and about one foot apart. Set them in as near a straight line as possible. The poles should all be set by the time the vines are three inches in height. By setting the poles early, many vines will run up of themselves which otherwise would not, and thus save much time in tying. The poles should be about four feet apart at the top, as this distance prevents the vines from running together, and gives the sun a chance to strike all parts. When the vines are about three feet in length, commence to tie them. There will probably be from twenty-five to thirty vines in the hill, all of

which must be cut out save two for each pole. In selecting these two, do not take the largest nor the smallest, but those of medium size. Never take more than two for each pole. In very rich ground it may be well to leave a couple of vines on the ground for future use, in case you should want them. In selecting the vines, take those that are nearest the center of the hill or inside of the poles, for in cultivating there is then less danger of injuring them. Be very careful in handling and tying the vines, for they are easily broken. Tie them just below the second bud, carry them around the pole from left to right, or with the sun. As soon as the vines grow three or four feet beyond the place where they were tied, go to each vine and cut off all trailing arms to the height of five feet; then commence to cultivate the yard. With a hoe remove all weeds from the hills, loosening the dirt, as is customary in the hoeing of corn. Do not hill up, however, if you would save your vines from the effects of the grubs, which, through carelessness, often destroy whole yards. After this hoeing, apply slaked lime or good wood ashes, sprinkling it with the hand in sufficient quantity to whiten the ground around each hill. Examine the earth around the roots of the vines, and kill any grubs that may be discovered. It pays well to search thoroughly for these pests.

About the first week in July, when the grubs have finished work for the year, hoe and "hill up" the vines. After this, the yard will require but little attention. The hops will be in full bloom about the last of July or first of August; and as from this time the hops increase in size and the poles get more heavily laden, they require more or less attention, especially after a hard rain or heavy winds. Many poles will be blown over or broken, and it is necessary to set them again. If they are allowed to remain on the ground, the hops will mould, and, after a time, spoil. The vines should be unwound from the end of the broken pole, which should be sharpened and set again as before.

PICKING.—The usual time to commence picking is early in September; but hops, like corn, ripen at all times, or, at least, at no particular time. When the hop is growing it is soft and open at the end, but it becomes hard and closed at the end, and decreases in size when it becomes ripe. The seeds also become brown, and on opening them you will find the kernel hard or solid. Much attention is required in picking hops, and in order that it may be done right, good boxes are

required. A convenient size for these boxes is six and a half feet long, two and one third feet wide, and two and one third feet high. Such boxes will hold about thirty bushels of grain, or enough hops to make about one hundred and thirty pounds when dried. About ten boxes will be required, also as many pairs of crotches, about four and a half feet in length, sharpened at the end. Commence picking on that side of the yard where the hops are ripest; count off the hills in four rows to the number of twenty-five; then place a box in the middle of these, and set one of the crotched stakes at each end of the box, for the poles to rest upon while picking. Three hands can work at each box at one time. They should be instructed not to pick the hops in bunches, as beginners are quite apt to do. To pick fast and clean, take carefully hold of from five to ten, close the hand lightly, and at the same time pull quickly, and the hops will break off at the stem and fall separately into the box. A little experience will enable one to pick quite rapidly. Two good pickers can pick from three to four boxes per day.

DRYING.—This is the most important process; for no matter how well the hops are grown, or how well they are picked, without proper and thorough drying, they will be inferior or damaged hops. A good kiln is necessary, which should be made of bricks or stone. The dimensions are about twenty-five feet long by twelve feet in width, and at least eight feet to the cloth on which the hops are to rest, with a height of about four feet above this cloth. This will enable the heat to pass through all parts of the hops on the dry floor, even on windy days. The pipes from the heating-stoves should never be nearer the carpet than four and a half feet; for if they are, the hops on the floor will be heated unevenly. The pipes should pass within three feet of the side walls of the kiln. Let the floor-cloth be of open texture and free from fuzz. It should be fastened around at the sides of the kiln, and rest upon slats, which should be two inches wide and one and a half inches thick, placed two inches apart, and firmly nailed to beams of two by four scantling, two feet apart. The hops in a green state are placed on the carpet to the depth of fourteen inches. As much as possible, avoid walking over them, as it injures them more or less. This cloth, when evenly covered to the depth of fourteen inches, will hold about three hundred bushels, or make about three hundred and forty pounds of dry hops.

Let the hops remain about twenty-two hours on the floor-cloth; if dried sooner than this, they are apt to be overheated. If they can not be dried fast enough in this kiln, (which is large enough for about four thousand hills,) make another. After the fire is started, the hops should not be moved until the steam has all passed off, and until the hops will rustle when handled, which, with a steady fire, will be in about fourteen hours. Then take a wooden shovel, holding about a bushel, and turn all the hops over. It will require time and practice to tell when they are in condition to be removed from the cloth. It can generally be done when the hop stem is dry. About one hour before removing the hops, let the fire go down, and open the kiln-door. If removed when warm, they will break to pieces. After being taken from the kiln they should not

be put with those previously dried until cold. If thoroughly dried, they will not change in size after being removed from the kiln. Always sweep the carpet clean after removing the hops. They should constantly be kept from the light, as it changes the color.

BALING.—This should take place about ten days after the drying. Make a press-box about five feet in length, twenty-two inches in width, and four feet four inches in height. For a bale, it requires five yards of strong cloth, which should be forty-two inches in width. Such a bale will hold about two hundred and fifty pounds. When baled, they should be placed on end, a short distance apart, so that a cat can keep the mice away. The bales should be kept from the wind.

NO. IV.—BY A. F. POWLEY, SQUANKUM, MONMOUTH COUNTY, N. J.

CAPITAL.—A wise man will count the cost, as there is more to be expended in the cultivation of hops, before they will make returns, than with almost any other crop. We have to plant, plow, prune, manure, and nurse with care; we must provide poles for staking, bins for picking, kilns for drying, and bags for packing, before we can get any returns from market. Experiments in culture can be conducted on a small scale, and several experimenters in one locality might join to build a kiln for drying their crops.

SOIL.—The hop, no doubt, will thrive on any land where we can grow good wheat or corn, but it prefers a deep soil; the deeper the better. Soils not too stiff or liable to bake, known as clayey loam, are good for hops. Hop roots run deep and spread wide; therefore the soil should be deep, moist, (not wet,) and mellow, with sufficient nourishment in it for the plant.

LOCALITY.—A hill-top is not favorable, as the wind will blow down the poles and beat the young vines, which are quite brittle; nor is a place subject to late frosts suitable, because of the danger of injury to the young vines. The locality should be free from frosts, at least from the middle of April to the middle of September. A site should be chosen as much protected from cold winds as possible. Wind and the flea are the chief enemies of the hops. Against the first we can guard, in a measure, but against the other there is no remedy but a good thunder-

shower. Where heavy fogs are apt to hang over a locality in summer time, and then the sun come out very hot, it will probably produce mildew. This happens in the dog-days, when the hop is half grown. Such places should not be selected.

PREPARING THE GROUND.—Plow deep, and sub-soil, if necessary, to secure a deep, well-worked soil. Manure heavily, with well-rotted barn-yard and stable manure, then furrow out the land in four and a half or five feet squares, as for corn, but somewhat deeper. At the crossing of the furrows, drop in a shovelful of compost, made of rotted sod and manure mingled with ashes, or indeed any manure that will make a pumpkin vine grow; work a portion of the soil in with the compost, and form a hill about one foot square, slightly elevated above the level ground. This furrowing and hilling must be performed in workmanlike manner.

PLANTING can best be done from the middle of April to the middle of May. Place three sets in a hill, two to the northward and one to the southward. Incline the heads toward each other, at an angle of thirty degrees; this will form the "crown" of the hill. The sets should be five inches long, and be placed in the hill so that the tops are about four inches apart, and about half an inch out of the ground. The "set" is not the root, nor what is termed the "runner." It should be obtained from a healthy, cultivated variety, by removing the soil from the main stock,

and cutting therefrom a "set," the growth of the preceding year. It should be five eighths of an inch in diameter, and taper upward. It need not have any roots, for it will form roots in the hill.

FIRST YEAR'S CULTURE.—This will not require much labor. Place a stake six feet long in each hill, and do not allow more than two vines to grow from each set. Keep the weeds out of the hills, and the ground loose. Cultivate a row of turnips, cabbage, or potatoes, between the hills. Oats sometimes are sown, allowing the vines to take care of themselves, but it is not a good plan. Cut the vines off, as soon as frost appears, at about six inches from the ground; if cut closer, they will be injured by bleeding.

SECOND YEAR'S CULTURE.—The ground must be well plowed in the spring, the hills opened, and a small amount of pruning may be needed. Cut off the dry stem of last year down to the "eyes," and loosen up the soil in the hill. Place two stakes in each hill, cultivating between the hill as during the preceding year. Be careful not to let more than six vines grow, as it should be the aim to get strong roots and crowns.

THIRD YEAR, AND AFTER CULTURE.—Open the hills as early as the spring will allow, and prune, by cutting the stock back, leaving eyes or buds enough to supply vines the coming summer. This pruning is to be performed each spring. Place manure around the hills, and dig it in. This is done in England with a tool called a "spud," made with a handle like a spade, with four straight tines, about one foot long; the tines are three inches apart, and stand inward nearly as much as the blade of a shovel. The object is to dig without cutting the roots, which can not be done with a spade. In England, they dig the whole of the "hop-garden" with this tool, commencing as early as February; but in the United States, it is customary to plow the ground. Nothing should be planted among them the third year, unless it be a few Ruta Bagas for winter. During the season, keep the ground loose with a cultivator, and stir the hills with a hoe. After pruning, dress up the hill, covering the crown about two inches with loose soil; dig in the manure. Set three or four poles twelve feet long, about fourteen inches apart. As soon as the vines have grown two feet long, they must be trained to the poles, remembering that the vine always goes around the pole southward, from east to west, or with the sun. Tie them to the pole, putting the string under a leaf. Train

three vines to each pole, on the north, and two to the one on the south. The tying must be attended to at intervals, until the vines are out of reach. All lateral branches must be taken off below four feet, and the hills "earthed," before the vines blossom. The earthing is simply placing two shovelfuls of loose soil in the hill. This year's culture is the rule for each future year. Longer poles will be needed hereafter. Hop-poles are cut twelve, fourteen, sixteen, eighteen, and sometimes twenty feet in length. Some place two eighteen or twenty-foot poles to a hill; others place three ten-foot, and still others place four shorter ones, according to the variety of the hops



FIG. 20. TYING KNOT.

and strength of the hill. For tying, matting or dried rushes are good. The matting is the inner bark of the linden tree, (basswood,) which comes in the form of bags or mats, about five by seven feet. This, cut into squares of ten inches, dampened and then parted, makes good strings for tying. The tying is done by passing the band once around the pole and vines, and forming a slip-knot, like that shown in Fig. 20. Such a knot will slip before it will cut the vine. In commencing the tying, the strongest vines should be selected, and all others, except a few kept in reserve, should be pulled up. If the "garden" is a success, there will be hops to pick, dry, and bale, at the close of this season. A bushel from a hill is a fair crop.

PICKING.—The time for picking hops is determined by rubbing them between the fingers. The seeds should be full and hard, and well studded with small round dust, of a golden color, at the base of the scales, and the stem of the hops should have plenty of this "condition," as in this is the weight. If the hop is too ripe, the wind will shake out the seed and dust, and loss of weight will be the consequence. If not ripe, these properties have not matured, and the weight will be inferior, but the hops will look better. If there is much picking to be done, and but few hands, it is best to commence rather early, for you will probably end late enough. In picking, bins are necessary. A bin consists of a wooden frame and a bag, called a "bin-cloth." This cloth is made from two pieces of sacking, thirty inches wide—one piece eight feet long, for the bottom, the other, twenty-one feet long, for sides and ends—formed into a bag, and suspended in the bin-frame. If necessary, this bag can have a partition in the middle.

The bin-frame requires two pieces, ten feet long, two by three inches, with the corners taken off and the ends rounded for handles. One foot from each end, bore one and a quarter inch hole for

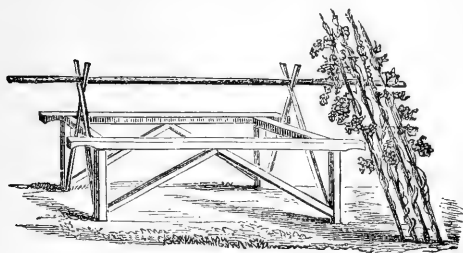


FIG. 21. HOP BIN-FRAME.

four legs, two and a quarter feet long; also one foot from the end mortice in two end pieces, two and a half feet long, three and a half inches wide, and one and a half inches thick. Brace each leg to the middle of each side piece. At each end put a brace to each leg, and let these braces extend above the top of the frame two and a half feet, and cross each other six inches from their ends. These top pieces are termed the "horns." These crosses are a rest for the pole while the hops are being picked. The vines should be cut about one foot from the ground. The poles are then taken with the vines upon them, and placed against the rest. The hops are readily picked from the vine into the bin. In England, hop-picking

is conducted with much system. An engagement is made with the pickers, the pole-pullers, the measurer, the poke-boy, the carrier, and the dryers. Thus the grower knows what each hand has to do. The ground is staked into lots of twelve hills square, and a stake is placed in the middle. The pickers are divided into companies, to which are assigned four bins. These bin companies are numbered, that each picker may know where he belongs. With each company is a bin man, whose duty is to pull the poles and carry them to the bins as the pickers require;

he also must help hold the "poke," (a long bag of ten bushels capacity,) must carry the bag to the wagon, strip the vines from the poles after they are picked, and help move the bins from one lot to another. He is paid by the day. Pickers are paid by the bushel. A tin ticket indicating the number of bushels picked is given

to the picker, upon which he draws his money at the office of the grower. A boy attends the measurer and helps hold the bag. The call to work, to dinner, etc., is made by blowing a horn. As soon as the kilns are supplied for the night, (for drying goes on night and day,) the work stops. One measurer, who acts as foreman, is required to about twelve companies. After picking is over, the poles should be stacked.

DRYING.—This is an important part of the hop business, and needs careful management, or the hops will spoil. The drying is conducted in a kiln called an "Oust." A circular or square wall of brick, one foot thick, about eighteen feet or less in diameter, is carried up to the height of twelve feet; then joists are placed in the wall at the height of eleven feet, across which are placed strips two inches square, and nine inches apart. Over these is spread a strong cloth made of horse-hair. Figure 23 shows a plan of the drying-floor.

The wall is carried about two feet higher, and plates are placed upon it, and terminated by a sharp wooden roof. At the top of the roof should be a hole about five feet in diameter, around which is placed a circular plate somewhat larger on the outside than the hole itself. Upon this plate is placed a cowl, a contrivance which keeps out the rain and lets off the vapor. It turns with the wind. On the ground-floor is the furnace. A door connects the kiln with the

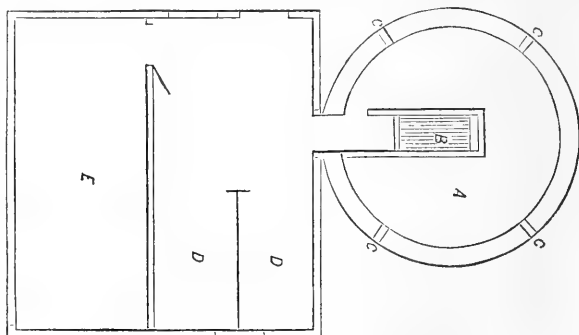


FIG. 22. GROUND PLAN OF KILN.

A, stove-room. **B**, stove. **C**, **C**, draft-holes. **D**, **D**, coal-bins, **E**, press-room.

storage-room below and the chambers above, for receiving, cooling, and packing the hops. The furnace is built so that the heat arises from the center. A wall two feet high is raised, upon which is placed an iron grate, three feet wide and four feet long. The wall is carried a few bricks higher, solid, after which it is raised in

open work two feet higher, the bricks lapping over each other about two inches. The two sides and back end being built, the top is covered by flat tile supported by iron bars laid across. A ground plan is given in Fig. 22.

The fuel used is charcoal and hard coal; nothing must be used that smokes. The hops are spread on the cloth to the depth of nine inches, if green, but they may be deeper if the hops are fully ripe. The door connecting with the chambers is closed, and the fire is raised by degrees, but not too hot at first, or the hops will cook in the steam. At the end of three hours, more or

The pocket holds one hundred and fifty to two hundred pounds. It is made of strong sacking twenty-two inches wide, sixteen feet long, and sewed with sail-twine. A handful of hops is placed in each corner and tied with a string, to serve for handles. The top of the bag or pocket is fastened to a hoop of suitable diameter, and is then let down through a hole made in the chamber floor, with the ring resting on the floor. Two bushels of dried hops are emptied into the bag, and a man gets in and presses them by treading around with his heels striking the bag. In the middle of this bag the hops are pressed

by means of a fifty-six pound weight, having a cord fastened to the ring, to raise it by. The hops are introduced and trodden down a bushel at a time, until the pocket is filled. The bag is then raised from below, and whilst in the hole in the floor, the hoop is unfastened and the bag sewed up; two corners being formed into handles, to assist in moving it. The bag is then let down through the hole into the storage-room below, weighed, marked, numbered, and stamped with the owner's name, when it is ready for the market.

Sometimes a press is used to pack the

hops in a bag, but they are apt to burst the bag, and do not press the hops as tightly as when trodden with the feet.

MANURES.—Woolen rags, chopped in shreds, are good to dig in, in the spring. These are largely used in England. Also "shoddy" (the combings of cloth manufacturers) is used. There is much virtue in these articles on heavy soils. Barnyard manure is good, worked in among the roots. Guano was used in England for many years quite freely, but it was considered as too expensive. A large growth of vines was thereby secured, but the hops were rather premature, and did not ripen evenly. Hop culture is healthy work. I worked on upwards of an hundred acres for years, and never saw a dryer or treader sick

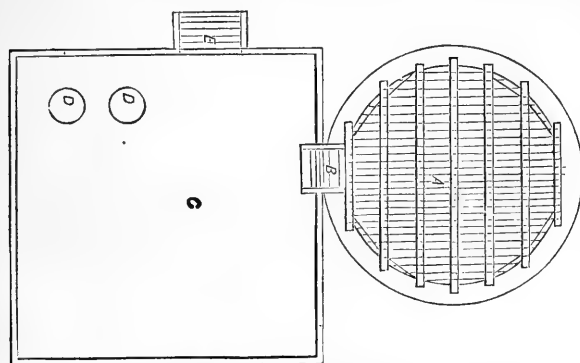


FIG. 23. PLAN OF DRYING-FLOOR.

A, floor covered with slats. B, steps to store-room, C, store-room. D, D, holes for baling.

less, as the state of the hops require, they must be turned. This is warm work, but soon done. The drying is continued until no vapor arises, when a pound or two of sulphur is thrown on the fire. When the sulphur fumes have passed off, the hops are removed to the cooling room. The sulphur brightens the hops, as well as prevents crispness after drying. Before the sulphur is used, the fire is suffered to subside somewhat, so that the fumes may act with more uniformity. After removing the hops from the kiln, replenish it with more, and proceed as before until all are dried. As soon as the cooling chamber is full, or so near full that more room is needed, the hops are trodden into bags or pockets. A bag holds about three hundred pounds.

NO. V.—BY ALBERT W. MORSE, EATON, MADISON CO, N. Y.

THE importance of hops as an agricultural product in this country will be perceived upon examination of the census reports. The total product of the United States in the year 1850 was about three and a half millions of pounds. In 1860, the production increased to nearly eleven millions of pounds. Of this amount New-York produced over nine millions of pounds. Nearly all are grown north of latitude forty. Their cultivation extends from the sea-coast to the Mississippi River. In the year 1861, about eight million pounds were exported.

SELECTION AND PREPARATION OF GROUND.—It is generally considered that hops can be grown to advantage on any land that will produce good Indian corn; but this rule will not always hold true. From long experience and careful observation, the writer has become satisfied that the *best* hops are grown upon new land, rich in organic matter, in elevated locations, with slight inclination of surface, to prevent water from standing thereon, and protected by wood-land, or high ground, on the north and west sides. The ground should be prepared the same as for corn, that is to say, manured on the surface, plowed deep, and sub-soiled. The sub-soiling will pay better for this crop than for almost any other, as the roots penetrate to a greater depth. Green-sward is considered as good, and by some better, than land that has been cropped. Harrow the land well, and roll.

MARKING OUT.—Provide as many sticks, fifteen or eighteen inches in length, as there are to be hills. Procure twine, (that used for tying wool will answer,) say two hundred feet, more or less, dip it in boiled linseed oil, and expose it to the sun to dry. This prevents the string from lengthening and shortening. When dry, measure it off into distances of eight feet, at which points pass a feather part way through the line, and allow it to remain there. Also prepare two more strings like the above, and mark them off at seven feet, more or less, according to the distance intended for the hills. Draw one of the last-named strings along the edge of the field, and the other parallel with it. Move the first-named along at right angles with these, taking care that the feathers are directly over each other. Employ a number of hands to stick stakes at each feather in the cross string; and in this manner go over the field.

Roots, or Sets.—Procure from an established

plantation, five bushels for each acre to be planted, of what are termed "runners," or growing shoots. These have eyes, or sets of eyes, from two to three inches apart. Cut them carefully into pieces containing two sets of eyes, rejecting all bruised ones. After they are cut, and immediately before planting, sprinkle the sets, and cover them with all the plaster (gypsum) that can be made to adhere to them. They are now in condition for planting. Runners, before or after they are cut in pieces, may be transported to any part of the country without injury. They should, however, be unpacked as soon as received, and be placed in a damp, cool place, away from frost.



FIG. 24. MANNER OF PLANTING.

Showing the position of the sets, and the manner of covering them and placing the stake.

PLANTING should be done as soon as the season will permit, which will be about the last of April or the first of May. The ground being prepared, the roots cut, and all ready, a hand, with a hoe, removes the earth from around the stake that marks the hill, making an opening three or four inches in depth, and ten or twelve inches broad, and of the form shown in the engraving, Fig. 24. Provide a dibble, or a sharp piece of iron, to make the holes in the manner shown in the cut. The sets are inserted in these holes, *taking care that the eyes on the set point upward*. Four sets, at equal distances apart, form the hill, their upper ends approximating as in the figure. A handful of bones, broken fine and thrown into the hill, will prove of great value by producing a rich, high-flavored hop. To cover the sets, take hold of the upper ends and pack the earth carefully around and over them, as shown in Fig. 24. The sets are sometimes planted like potatoes, and sometimes an iron crowbar is used, the sets being held by one hand and the earth filled in around them. On examination of hills planted in this manner, they are frequently found twisted together in the form of a rope, much to the injury of the

hill. There is another mode, that is regarded by some as having advantages over the above methods, which is as follows: Take the prepared sets and bed them, or plant them in rows sufficiently wide to admit of the free use of the cultivator; a single set in a place from five to six inches apart. The bed should receive careful attention in the way of hoeing and weeding. A dressing of special manure is useful. The best that I have ever used consists of six or eight parts of charcoal dust, two of pulverized hen manure, and one of plaster. This is also a valuable manure to be used yearly, after the first hoeing. The sets should be taken up the next October, and planted with great care. One strong healthy set will make a hill. Immediately after planting, the hill should be covered with two or three shovels of manure. A yard planted in this manner will come into bearing the next season, the same as if planted out, as in the manner first described. It is customary to plant corn, potatoes, beans, tobacco, or any other hoed crop, with hops the first year. The crop that shades the least is best.

MALE HOPS.—In the center of every hundred hills, or at regular and known intervals, should be planted a male hill. The poles should be left standing at these hills. When the shoots are taken from these, they should be tied in bundles and put by themselves, to prevent their becoming mixed with those of the bearing plants. The male plant is of the utmost importance; for without this, it is impossible to produce good hops.

POLES.—As soon as the plants have taken well, which can be determined by the middle of June, the poles should be secured, as they should have time to season. Any kind of poles may be used, but cedar is much the best. Their length is generally from eighteen to twenty-five feet, and not over four inches diameter at the large end. On strong land the longest poles should be used. There are various methods of training the hop other than on poles. [As these are described elsewhere, we omit the account of them.—Eds.]



FIG. 25. GRUB-HOOK.

WORK FOR THE SECOND SEASON.—Plow the land each way, as near the hill as can be done with-

out breaking the roots. Remove the manure to one side of the hill; then with an implement called a "grub-hook," (Fig. 25,) loosen and remove the earth from around the hill to the depth of three or four inches, and pull up the surface runners, and trim them off near the hill. Also cut off the crown or top of the hill from one to two inches. See Fig. 26, which represents the plant before trimming, and Fig. 27, which shows

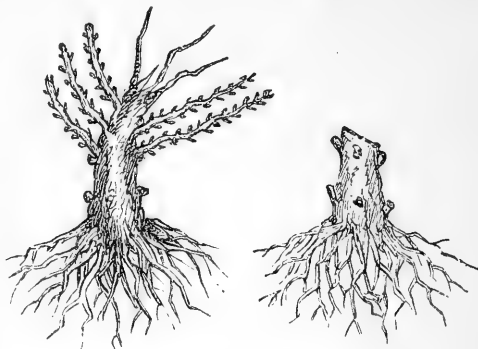


FIG. 26. PLANT UNTRIMMED. FIG. 27. PLANT TRIMMED.

it after trimming. Break the manure and mix it with the earth around the hill. After which, cover with fine earth. The above should be the treatment each year. The poles should be put up immediately after the grubbing above referred



FIG. 28. CROW-BAR.

to. Provide a bar of the form and proportions indicated in Fig. 28, with which make two holes, twenty inches apart, on opposite sides of the hill, inclining them outward at the surface sufficiently to spread the top of the pole three or four feet. The strongest and best poles should be used in the outside rows, as this will, in a great measure, prevent damage from wind. In sticking the poles, they should be lifted vertically, and thrust into the hole. By the middle of May the shoots are long enough to tie up. Generally a number of them will wind themselves around the pole, but all should be removed but two of the most thrifty to each pole, but not the rank blue vines. It is well to save for a short time a number of vines, say two or three to each hill, to put up, in case of accident to those that have been trained up. The rest of the vines should be either pulled out or broken down and covered with earth. The head of the vine sometimes becomes destroyed after the vine has grown too high to be removed. In such

cases, the first set of arms will start out in opposite directions, one of which should be removed, and the other be tied to the pole. A ladder, represented in Fig. 29, will be found very convenient. The cultivator should be used sufficiently often to keep down weeds, and the hills should be dressed with a hoe three or four times. On moist land, hill up; on open soils, keep the hill level with the ground. The middle or last

of July, before the blossoms appear, the ground should be cultivated, and also the last of August, or a short time before picking.



FIG. 29. STEP-LADDER.

The kilns are round in form, and may be con-

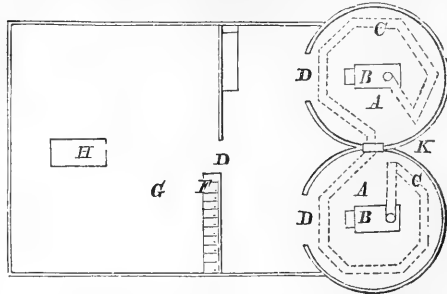


FIG. 31. GROUND PLAN OF DOUBLE KILN.

A, stove-rooms. *B*, stoves. *C*, pipes. *D*, doors to wood-room. *F*, stairs. *G*, press-room. *H*, press. *K*, chimney.

structed of wood or stone. If of wood, a balloon

frame will be found most convenient. The floor shown at *m*, Fig. 30, should be fifteen or sixteen feet from the ground. It is generally made of one by one and a half inch strips of boards, set on edge. Over this floor is a cloth, somewhat resembling that used for strainers, hard twisted with small meshes. On the cloth the green hops are deposited to be dried. The kiln, if constructed of wood, should be lathed and plastered, above as well as below the floor. Air-holes are shown at *R*, which should have a door, so as to be able to close down at pleasure. There are large doors, *P*, *P*, into which the hops are thrown from the platform *O*. A ventila-

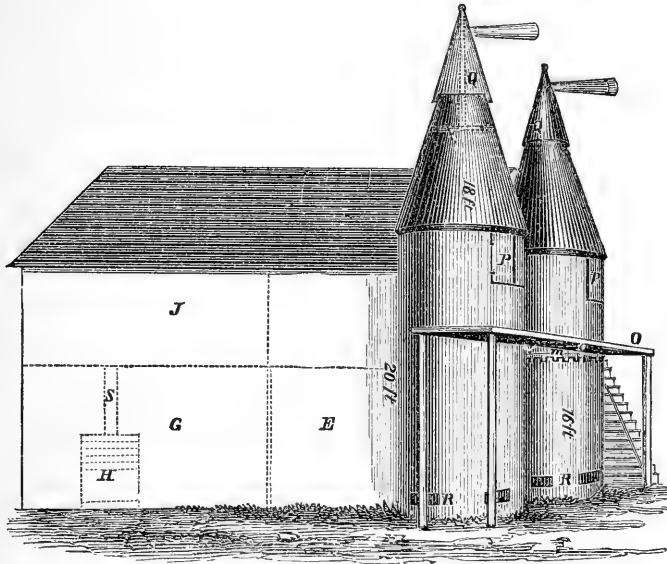


FIG. 30. ELEVATION OF DOUBLE KILN.

E, wood-room. *G*, press-room. *H*, press. *J*, store-room. *m*, drying floor. *O*, platform from which to charge the kiln through the doors *P*. *Q*, ventilators or cowl. *R*, lower ventilators. *S*, conductor of cloth to convey hops to press.

THE KILN.—This should be built prior to the tenth of September, when, in ordinary seasons, the hops will be in condition to begin harvest. The size will depend upon the number of hops grown. For a five-acre field, two hundred square feet of surface of drying room will answer. For yards of ten or more acres, two drying-rooms will be found convenient. The hops picked in the forenoon should be put on to dry at noon, and those picked in the afternoon are placed in the kiln at evening. Figs. 30 and 31, with the description, will give an idea of what is needed for a large yard.

tor, *Q*, is placed at the top of each kiln. The other parts will be understood from the references below the figures. The stoves should be large enough to receive three-foot wood, and the stove-pipe not less than ten inches in diameter, so arranged as to equalize the heat, and dry the hops evenly. The horizontal pipe should be six or eight feet from the kiln-cloth, and extend slightly upward. All dust is to be removed from the cloth daily, and before starting a fire. Fig. 32 represents an implement with which this can be done much better than with a common broom. The pipe should be sup-

ported upon standards, with forked iron tops. The utmost precaution should be taken against fire, as the building, during the drying season, will be like a "tinder-box," and it should not be intrusted to a careless hand. The time required for drying a kiln, with the hops say twelve to fifteen inches deep, will be twelve to fourteen hours. To determine

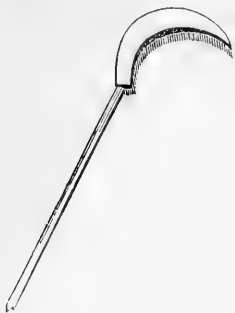


FIG. 32. BRUSH FOR CARPET.

examine the inside. Three fourths of all should break or crumble when pressed by the hand. During the drying, it is customary to burn brimstone three or four times; first, when the hops are warmed one third of the way through, and last when the heat has reached the surface. The amount of drying required will depend upon the condition of the hops. If it is rusty, more will be required than at the beginning of picking. The person having charge must determine this matter; from two to three ounces are generally used. Two or three hours before allowing the fire to go low, the hops should be stirred. This is generally done by going through them, taking care to keep the feet under them; then level them off. During this operation the air-holes should be closed. Some turn them over with a shovel, when two thirds dried. The hops are now ready to be removed from the kiln, but there is no objection to allowing them to remain on the kiln until it is wanted for another lot of green hops. Care should be taken not to break them.

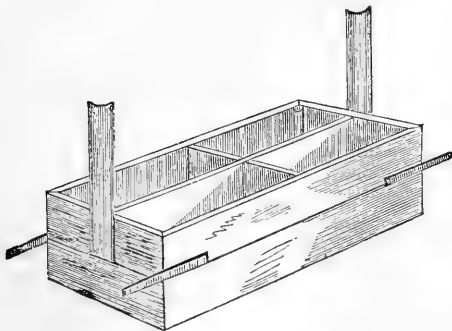


FIG. 33. PICKING-BOX.

PICKING is generally performed by women. The boxes are made to accommodate four pickers, having for each a compartment three feet long, eight

teen inches wide, and thirty inches deep inside measurement. (See Fig. 33.) Men are employed to take down the poles, and place them on the box. One hand can generally attend to eight pickers, and stack the poles in parcels of fifty or seventy-five in lines, on every fifth or sixth row. A hop is considered in condition to begin picking when the color begins to change from a light green to a deep yellow, and the seed is hard. Generally, about two weeks is taken for hop picking. Green hops are liable to become heated, if allowed to remain in bulk even over night, and it is advisable to stir them late in the evening. Heating will cause the "*lupulin*" to drop out. The plantation is much injured by early picking, on account of the bleeding of the vines. The vine should be cut off from fifteen to twenty inches above the ground; the stump will stand erect, and the cut end will soon dry over.

PRESSING AND SACKING may be done as soon as the hops are cold, but it is better to allow them to remain for fifteen or twenty days, stirring them occasionally, after which time there will be little danger from heating, if they are properly cured. Presses may be had, made expressly for this purpose, with full directions for using. Hop-sacking can be procured from merchants; it is known as "Dundee bagging." The size of the bales will be regulated by that of the press; they generally weigh from two hundred to two hundred and fifty pounds.

The value of hops depends upon the amount of "*lupulin*," commonly called flour, which they contain. It is therefore important that they should be picked with *great care*, and that all foreign matter be kept out. A prime article will generally command twenty-five to thirty per cent more than those that contain even a small amount of leaves and stems. It is not uncommon for growers to make two or three sorts. A very good mode of preventing foreign matter, such as leaves, stems, bark from the poles, etc., etc., from mixing with the hops, is to partly cover the boxes with sacking, giving it an inclination sufficient to allow the hops to roll into the box. By this arrangement, much worthless matter will be excluded. It is surprising to see the amount of filth that will accumulate even in the picking of a single box. Its exclusion will lessen the gross weight, but the increased value of the article will doubly compensate the grower.

PRESERVATION OF THE YARD.—The best mode of keeping a hop plantation in a healthy condition, is a matter of great importance. It is a

well-known fact that some yards begin to fail in three or four years, and are thenceforth hardly worth the trouble of cultivation, and that others last ten, fifteen, and even twenty years. This is doubtless owing to a number of causes, the most prominent of which is the following, namely: The planting upon ground that is over-charged with water; neglect or want of proper cultivation; exhaustion of the soil, of some of the proper ingredients for the growth of the vine. All may guard against the first two causes of failure. The last will be found more difficult. It may be done by supplying the soil with the necessary ingredients in the form of wood ashes, which are exactly suited to the wants of the hop, and tend to promote a vigorous growth of vine. The refuse vines can also be used to advantage, if cut and mixed with the soil in proximity to the roots. Another important advantage is derived by using the vine in the manner above stated, namely, it tends to lighten the soil which, by the yearly application of barnyard manure, not unfrequently becomes heavy, and the root soon becomes unhealthy. The use of charcoal dust,

which I have before recommended, together with a thorough loosening of the soil, will tend to keep the plant in a healthy condition. When charcoal dust can not be procured, decayed wood, leaves, and such other vegetable matter as can be collected from the forest, will be found valuable. Like most other plants that require high manuring, a dressing of lime will, upon most land, prove valuable, applied as often as every two or three years.

YIELD AND PRICE.—The yield per acre, as shown by the last census, in counties where hops are most extensively grown, has an average of about eight hundred pounds. By high cultivation, two thousand pounds, and in some instances, twenty-five hundred pounds are obtained. The fluctuation in the price of hops is greater than that of any other farm product. Good hops often sell as low as ten cents, and not unfrequently as high as forty, fifty, and even sixty cents per pound. They may be consigned to commission merchants the same as other farm products, or sold to dealers at home.

NO. VI.—BY T. A. COLE, SOLARVILLE, SCHOHARIE CO., N. Y.

PREPARING THE SOIL.—Hops should be planted upon sward-ground if possible, and it is best to turn it over the previous fall. Decomposed sod is peculiarly adapted to this plant. It is highly necessary in planting a yard that every hill should grow. Out of three thousand hills planted in the way I shall describe, I lost but twelve. After the ground is plowed, go over it with a heavy roller, which smooths the surface and prevents the sod being loosened by the harrow or cultivator. Then manure the ground on the surface with compost. I prefer any good compost to barnyard manure, and also hold that a hop-yard never should be allowed to rob the rest of the farm. The usual time for planting is from the first to the twentieth of May, but never until the ground is dry and warm.

SETS FOR PLANTING.—Procure shoots for planting as soon as they are taken from the ground, and prepare them by cutting them in pieces from four to six inches long, being sure that they are sound and contain two sets of buds. Then put them in the cellar and sprinkle them every day or two with rain-water, until ready for planting. All that are good will sprout in a

very short time. Care should be taken not to break off the eyes when planting.

MARKING THE HILLS.—Prepare stakes, one for each hill, about twenty inches long and one half inch square. After the ground is thoroughly cultivated and harrowed lightly, it is ready for staking out. My hop-rows are seven feet apart one way, and eight feet the other, running with the points of the compass as near as possible. To stake out a yard, take a strong cord and mark it once in seven feet by tying on a piece of colored yarn. Tie each end of the cord to a stick about two feet long, sharpened at one end. Square the piece of land, then draw the cord across the piece from north to south, place the sticks firmly in the ground. Now put one of the small sticks in the ground opposite to where the yarn is tied, and so on the length of the cord. Move each end of the cord exactly eight feet at a time, and continue the staking. After the poles are set, the amount of ground to be worked with the cultivator is the same each way. Experience and observation have taught me that seven feet by eight is the true distance.

PLANTING.—The best method of planting is to

pull up the stake which marks the hill, and precisely where it stood make a hole with an iron bar, just deep enough to get through the turf. I take four sets for a hill, placing one between each two fingers and one between the thumb and forefinger, with the buds pointing upward. If the set be inverted it will not grow. I place the hand holding the roots perpendicularly over the hole, and with the other hand fill in the dirt, keeping the fingers spread so that the sets do not touch each other, the upper end of the sets being held even with the surface of the ground. As soon as the roots become fast in the dirt, I take both hands and cover the whole $1\frac{1}{2}$ to 2 inches deep. The stake that belongs to the hill is set into the ground, about four inches from the hill and lengthwise of the row, letting it slant directly over the hill.

CULTIVATION THE FIRST YEAR.—Plant corn and potatoes with hops, and as the stakes show precisely where the hop-hills are, you can plant and hoe other crops without injury to the hops. I plant one hill of corn or potatoes between the hop rows the narrow way, and two the wide way. Do not plant any thing nearer than eighteen inches. A small handful of wood-ashes and plaster to each hill once or twice during the summer acts as an excellent stimulant. I hoe the hops very much the same as corn, keeping the ground loose and free from weeds. The last time of hoeing, I make a slight hill by raising up the vines and putting the dirt about the roots. Nothing more can be done until the corn or other crop is removed. I prefer to wait until the ground is frozen before manuring; if there is a little snow, it is all the better, as the stakes will show precisely where the hill is, and the manure should be placed directly upon it. If the manure is applied too early in autumn, it has a tendency to smother the hill. I use manure or muck one year and lime the next, alternating each year. I can not speak too highly of the beneficial effect of lime upon hops. I used it upon a piece of hops that had been four years planted, and which had been heavily manured with barnyard manure each year; yet the greatest yield in any one year had been but one thousand pounds of dried hops per acre. I placed about one quart of fine unslacked lime directly upon each hill late in the fall, and covered it with dirt, all other treatment being the same as in the four previous years; yet the next year the yield was 2300 pounds of prime dry hops per acre. When lime is used, I give no

other dressing whatever. If manure or muck is used, I apply a dressing of ashes, plaster, and salt in the spring, after the hops have been tied up. Four barrels of ashes, two of plaster, and one of salt is sufficient for one acre. The effects of this application will be apparent not only in the growth, but in freeing the hill from worms.

THE POLES are most economically drawn upon the ground during the winter after planting. I set my poles the second season, as soon as the frost is out of the ground, having the rows of poles run from east to west, using two poles to each hill and placing them six or eight inches from the center, on either side. Good hop-growers concede that nothing as yet has been invented equal to good cedar poles for raising hops—at least my experience has taught me so.

SECOND YEAR'S CULTIVATION.—As soon as the ground is dry enough, I plow the yard both ways, using a light steel plow and only one horse. The whiffletree is very short, so as to allow the horse to travel close to the poles without hitting them. Four furrows between the rows will be sufficient, turning the furrows from the hill both ways. The dirt about the hill is then loosened with a grub-hoe or hook, such as is used by fruit-growers. The first year there are no runners to be taken out, but afterwards there will always be more or less of these. The runners strike out horizontally from the hill, coming out of the ground two to four feet from it; these are dug up with the hook and cut off close to the hill, also the old stalk or vine is cut off close to the ground, and a little fresh dirt thrown upon the hill. This is called grubbing. When a yard is planted as above described, the main root of the hill strikes perpendicularly into the ground to a great depth. After the vines have been grubbed, they are allowed to grow, and many of them will find their own way up the poles. They will, however, need looking to very frequently, and those that do not climb must be tied upon the pole with a bit of yarn long enough to reach around the pole and have the ends lap a little. These are twisted together with the thumb and finger, leaving it loose enough for the vine to grow. Two vines are allowed to each pole. After they have got well started, I plow the yard again, turning the furrow toward the hill in plowing both ways, and plow four furrows between the rows; this will cover all the vines not needed upon the poles, leaving the yard level and clean. The remainder of the season I use a cultivator with teeth long

enough to keep the ground loose as deep as it was plowed, using the same short whiffletree as on the plow, cultivating frequently both ways, or at least three times during the summer. By running close to the hill, especially at the last cultivating, which should be just before picking, most of the runners are destroyed. This obviates the necessity for digging them out in the spring, which weakens the hill, and, if there are many runners, sometimes destroys it entirely.

PICKING.—Hops are generally ripe enough, here, to commence picking from the first to the tenth of September. When ripe, the hop has a yellowish hue and a strong, rich smell, and the seed is brown and hard. Care should be taken in picking to have them as free from stems and leaves as possible. Boxes for picking in are generally made of half-inch stuff, in order to have them light and easy to handle. They are made 6 feet long, 3 feet wide, and 26 inches deep, and are divided into four apartments of 3 feet long, 18 inches wide, and 26 inches deep. Each of these holds very nearly eight bushels. At each end of the box there is a standard rising about two feet above the box, upon which a bar is placed, projecting about two feet at either end. Against each end of this bar a pole is placed while the hops are being picked, one pole at a time. The box is to accommodate four pickers, one to an apartment. The apartments are generally called boxes, and the picker receives so much per box. Care should be taken, before pulling the pole, to cut the vine as high as possible, and have it stand up after the pole is taken away, as the flow of sap is much less than when cut lower. The poles should be trimmed and set up in stacks as fast as cleared. Bags or sacks are prepared to hold the green hops; they are usually made about six feet long, and will hold two boxes of green hops. The same bags are used to press the hops in when cured. All the hops picked each day should be placed upon the kiln for drying, as they are liable to injure by lying in the bags over night.

DRYING-KILNS.—I prefer a good wooden building for a kiln, as it can be used for many other purposes when not required for hops. My kiln is 20 feet wide by 36 feet long, with 16-foot posts placed upon stone-work 3 feet high. It is divided into four apartments, two below and two above. The stove-room occupies about one half the lower part of the building; this contains the stove with pipe running around the entire room before it enters the chimney. There are four

small doors in the wall, one upon either side, to admit the air, and they may be opened or shut as occasion demands. This room is plastered upon the sides. The floor overhead is 15 feet from the ground, and 7 feet from the pipe; it is made of joists, with slats $1 \times 1\frac{1}{2}$ inches, placed edgewise and nailed upon the joists one inch apart. Over these a thin strainer-cloth is drawn and tacked down along the sides. The room directly above the stove-room is called the curing-room, and is plastered upon the sides and overhead, except under the ventilator. The ventilator is upon the roof of the kiln, directly over the center of the curing-room, and is constructed with four glass windows or doors, one upon each side. These are hung upon hinges, and may be opened or shut at will. A door connects the curing-room with the store-room. The floor of the store-room is some six feet lower than that of the curing-room, and is directly above the press-room. A door opens from the curing-room upon an outside platform that projects from the kiln about six feet. The ground here rises abruptly, making it very easy to remove the green hops from the wagon to the platform.

DRYING.—The bags are taken from the platform and emptied upon the floor of the curing-room, and the hops leveled with a common hand-rake. One or two of the doors in the ventilator are opened to allow the steam to pass off. When the fire gets well started, the small doors, or air holes, in the stove-room should be opened and a good fire kept up until the hops are thoroughly cured. As soon as the steam begins to rise, a little brimstone should be burned upon the stove; this helps the drying and improves the hops. As soon as the hops nearest the cloth become dry, they should be turned over, and again leveled with the rake, and a steady fire kept until they are sufficiently cured. Too much drying injures them, while too little spoils them entirely, hence it needs good judgment and some experience to do it right. The hops should be allowed to cool before being removed to the store-room, and they should be handled over once or twice after being placed there. If possible, it is better not to press the hops under two or three weeks after being dried; yet if it is necessary, it may be done within a day or two.

PRESSING.—A small hole is left in the floor between the store-room and press-room, in which is inserted a bag, open at both ends. Through this, the hops are allowed to fall directly into the press. The press is so constructed that it is

easily taken to pieces and put together. One of the bags used for carrying the green hops is cut in two, making two pieces. The bags are made of coarse sacking, usually about forty inches wide. Four yards of it is used for each bag, being doubled together and sewed up at the sides. When cut in two, there are two pieces six feet long and forty inches wide, making just enough for a bale. One of these pieces is placed upon the bottom of the press lengthwise, then

the sides of the press are put up, and the hops allowed to run into it from above, two men treading them down until the press is full. The other piece of cloth is then placed over the hops at the top of the press, and is forced down by the follower until the edges of the two pieces meet, when the sides of the press are taken off and the bag sewed up on each side. The follower is then loosened and the bale is taken out and sewed up at each end, when it is ready for market.

NO. VII.—BY ZUAR E. JAMESON, IRASBURGH, ORLEANS CO., VT.

SOIL AND PLANTING.—The soil best adapted to hops is that which will yield good corn. It should approach nearer a sandy than a clayey nature, and should be sufficiently dry to be worked early and through the season. Prepare the soil as for corn, and either early in the spring, or in the fall, procure cuttings from a mature yard. These cuttings are white runners that are under the surface of the ground, with buds from 2 to 5 inches apart, and as they are not roots that nourish the plant, taking them away does not damage the hills, while, if allowed to remain, they would produce a great surplus of vines. Mark the hills eight feet apart each way, which will give 730 hills to the acre. A good way to do this is to have a string, 10 or 12 rods long, with strips of cloth tied upon it eight feet apart. Provide as many stakes, a foot long, as there will be hills; draw this string across one side of the piece, and set a stake by each mark on the string; move both ends of the line forward eight feet, and again stick stakes; and so continue until the whole plot is regularly staked eight feet apart each way. Cut the hop-runners in pieces, leaving two eyes on each piece or set. Put three of these into each hill, about 10 inches apart, at the corners of a triangle. If this work is done in the spring, plant corn, the hills in the rows alternating with those of the hops, and a row of corn between those of hops. The hops will be sufficiently cultivated if the corn is well cared for, as no crop of hops is expected the first year. After harvesting the corn, and about the time frost kills vegetation, put a shovelful of well-rotted manure, compost, or leaf-mould upon each hill; this will be a protection against frost as well as a fertilizer. If the yards are set in the fall, plant and manure in the same way. A small crop will be yielded the following year. On an acre, there should be distributed ten male hills, and, as they do not produce hops, part

of each hill may be female vines. If there are no male vines, there will be no seeds, and not much flour, and the hops will be light and inferior. The leaf of the male vines is more notched about the edge than that of the female, it blossoms earlier and the flowers fall off while the female hops are growing.

SECOND YEAR'S CULTURE.—In the spring, before the hops start, which is quite early, pulverize the manure and work it into the earth about the hill. If all the sets grow, set three poles to each hill, and let two vines run up each pole. Let the poles incline outward, so as to be three feet apart at the top. They should be from ten to fourteen feet long, and from two to four inches in diameter at the base, which is sharpened to a point and stuck about ten inches into a hole prepared with an iron bar. The best wood found in Northern Vermont is red cedar. Spruce, ash, fir, and hemlock are preferred to birch, maple, and poplar. Small trees are much used, and cost here from two to four cents each. Some have tried poles sawed from three-inch plank, square at one end and tapering to a point, but they are not as strong as small trees. The main point is to have poles that will bear the weight of vines and hops in the severest wind. The method of having one pole to each hill, with strings radiating in four directions to other poles, and a vine to each string, has not been tried here. When the vines are from two to four feet long they should be tied to the poles with woolen yarn. Cut the foot from an old stocking and place the leg over the left wrist and unravel as it is needed. Tie the vines so that they will run from east to west. Re-tie any that fall or are blown down. For these operations a short ladder or steps are necessary. Cut down all other vines that appear during the summer. The tillage is mostly done with a cultivator. Sometimes good crops are raised among

weeds, but the prejudice is decidedly in favor of clean cultivation. It is not advisable to have high hills; keep them rather flat.

INSECTS AND DISEASES.—The cut-worm, or grub, will often eat the vine below ground. Its presence is shown by the wilting of the leaves. The offender can often be found and killed, and sometimes the vine, when partially severed, will root above the injury and grow. Worms breed in stable manure more than in hog manure or leaf-mold. Rust affects hops as it does the other cultivated crops. If they are nearly matured when attacked by rust, pick them without delay. Lice very much damaged the crop of 1864; they covered the leaves and stopped the growth. Yards on high land were least affected. No remedy is known: brimstone has been tried with no definite result. Frost occasionally comes before the hops are harvested, in which case hasten the picking as rapidly as possible.

PICKING.—The proper time for picking is known by the hops changing from green toward a straw color. Picking is generally done by girls, who are paid from 33 to 60 cents per day, and will pick from one to three boxes, according to the yield. Care should be taken to

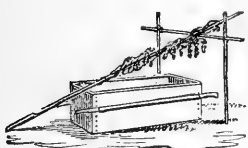


FIG. 34. PICKING-BOX.

exclude leaves and stems. The boxes are made of half-inch boards, are five feet long, twenty inches wide, and two feet deep. In each corner is a strip $1\frac{1}{2}$ inch square to nail to, and give firmness. For handles, nail on each side a 1×3 -inch strip $7\frac{1}{2}$ feet long. The man who pulls the poles should have a corn-cutter to cut the vines near the ground and any straggling vines that may have become attached to other poles; he then pulls the pole and lays it with its burden of hops over the box, one end resting on the ground and the other supported on a cross pole lashed to two upright ones, as shown in Fig. 34. When the hops are picked,

he draws the pole out of the vine and puts it in the stack. The stack is commenced by tying three poles together, as in Fig. 35, and standing the other poles against them, in which position they are left through the winter. Two men will wait upon a dozen pickers. When seven or eight boxes are picked there will be enough to commence drying.



FIG. 35. COMMENCEMENT OF POLE-STACK.

THE KILN.—The hop-house is often made of some old out-house, but if built specially for the purpose, it should be a two-story building, on a hill-side, if convenient, as it is easier carrying the hops to the dry-floor on the second story. In the lower story, where the heating apparatus and press are situated, no floor is necessary. The second floor is occupied by the kiln and storage-room for the dried hops. For a yard of two or three acres, a building 25×30 , with 14-foot posts, is large enough, and need not cost more for outside finish than a barn of the same size. The lower room of the kiln should have a double wall, the space filled with sawdust or spent tan-bark, or it should be lathed and plastered, so as to be nearly air-tight. Heat may be generated by charcoal burnt upon the floor, or in a stove with plenty of pipe, or in a brick or stone arch. The pipe should go quite around the room and across the middle before it enters the chimney. The stove or arch may open into the press-room. The *Drying-Room* above may be plastered for four feet up, to keep off cold currents of air. This room is open to the roof, where there is a ventilator for the escape of steam. The floor is made of sawed slates, $1\frac{1}{4}$ inches square and one inch apart, over logs or joists 18 inches apart. This floor is covered with dry cloth sewed together and fastened down like a carpet. After drying is over, take the carpet up and keep it safe from rats and mice. Cover the carpet from 6 to 10 inches thick with hops, according to their dampness and greenness; start a moderate fire; as soon as they are thoroughly warmed through, increase the heat and dry rapidly, for if dried slowly, the steam will condense upon the top hops and turn the color dark and dull. Ten hours will generally be long enough to dry them, so that two kilns can be dried in twenty-four hours. The test of dryness is when the stem in the middle of the hop will break easily; if it can be twisted and bent, it is not dry enough. There should be a door to rake the hops through from the kiln to the storage-room, where they should lie up light, until cool, after which, if necessary, they may be trodden down.

PRESSING AND BALING.—The essential requisites in a press are a wooden screw, turning in a wooden nut fastened in the floor of the second story, with the head of the screw underneath, and a box with movable sides and ends, a bottom, and a follower. The press was formerly made of heavy timbers, securely framed together, but we now use a better style. Procure four

rods of $3\frac{1}{4}$ -inch iron, about 16 feet long, and have the ends of each welded together like a large link of chain. Make four mortices in the floor above each corner of the press, to receive one end of the links which are supported by a piece of strong scantling (4×4 or 4×5) passed through the links above the floor. These pieces also rest across the ends of the wooden nut. (Fig. 36.)

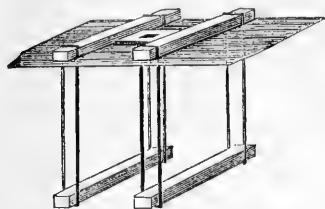


FIG. 36. MANNER OF SUPPORTING PRESS.

In the lower ends of the links place two pieces of timber 4×6 for bed-pieces to rest the bottom of the press upon. The bottom is made of pieces of 2-inch planks, two feet long, with end-strips $3\frac{1}{2}$ feet in length. The shape of the bottom is shown in Fig. 37, with the bed-pieces extending out at the ends. The mortices in the bottom are for studs which hold the sides of the box, and are 2×5 inches, cut into a tenon 2×4 , which leaves a shoulder. The upper ends of the studs should be tapered off toward a point; they are held by a strip with two long mortices, which strips are placed on the top of the studs, as in Fig. 38.

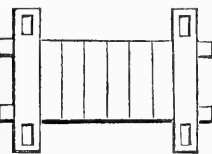


FIG. 37. BOTTOM OF PRESS.



FIG. 38. STUDS TO HOLD PRESS TOGETHER.

The back side of the press is in one piece, with cleats near the end to hold upright the end pieces, which may be made of one plank 18 inches wide and 6 feet long, standing on end. The front side of the box should be in parts. The box may be 5 feet long inside, 18 inches wide, and 6 feet high. Fig. 39 shows the press put together. Put two yards of hop-sacking on the bottom, and provide a cloth spout from the storage-room through the floor to the box, for conducting down the hops. Have a man treading them down, and when they are

five feet deep in the press-box, put two yards of hop-sacking on top. Then place the follower and turn the screw, which, as it works down, makes it easy to take out the front side of the box one plank at a time, till the mass is less than two feet deep. Then take the piece of plank from the top of the studs and they will fall apart and can be taken out, when the box may all be removed. Sew up the cloth along the sides and fold the ends. If the cloth is quite loose, on removing the screw it will be full. The press described can be packed away, leaving the lower story as a wagon-shed or store-house during most of the year.

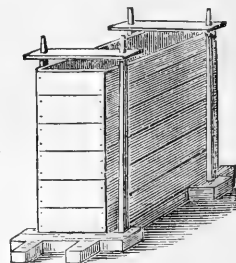


FIG. 39. THE PRESS.

INSPECTION. — Formerly, in this State, (Vermont,) an inspector was appointed by the Governor, but the office is now abolished. His fee was one mill per pound for inspection. It was done by piercing the bale, and judging by the sample extracted. Hop-growers should use their influence to secure the appointment of a reliable and experienced man to this office. If the crop is marketed through a commission merchant, the inspection should be reliable. The amount to be sold will vary from one thousand to two thousand pounds per acre, and the price will vary from five to fifty cents per pound. If a good price can be obtained, it is better to sell soon after packing, on account of the rapid loss of strength by keeping, and a corresponding decline in price of old hops. As regards the varieties of hops, there is no distinction made in the market; yet there is a difference in the varieties, and those who have yards that produce large, nice hops, find a ready market for their surplus roots among those who are starting new yards. In cultivating hops, in connection with other crops, the tendency is to apply manure to this crop to the great damage of the rest of the farm. This should be guarded against, for those crops which furnish the food upon which we live must not be neglected.

NO. VIII.—BY EDWARD FRANCE, COBBLESKILL, SCHOHARIE CO., N. Y.

SOIL.—Deep, gravelly uplands, exposed to a free circulation of the atmosphere, are best, for upon these the hop is not so liable to be attacked by blight, mold, and mildew, as on low lands or where there is not a free circulation. After a proper selection is made, the soil should be freed from foul weeds, especially quack-grass, as the roots of this grass, when allowed to remain, frequently destroy whole plantations. Ground that has been cultivated to corn or potatoes the previous year is preferable. The soil should be deeply plowed late in autumn, thus exposing the roots of weeds to hard frosts, which cause them to decay. As early in spring as the ground will permit, it should be again plowed, after which a coat of good manure is applied and plowed in.

SETTING THE PLANTS.—About the 8th of May is a good time to set hop-roots. The hills should be made in squares, about $7\frac{1}{2}$ feet apart each way. Every fifteenth hill each way should have a male plant, to assist in perfecting the others. The male plants can be readily distinguished in the month of July, as the blossoms are different from those of the female plant. These bear no hops, but finally wither away. Much care should be taken in selecting good, healthy roots for setting. They are generally taken from old, well-established plantations, and are commonly termed runners; they are found near the surface, and should be carefully taken from the mother plant by the aid of a pruning-hook or knife, severing them about eight inches from the plant. The main root must not be disturbed more than can be helped, as it is easily injured, and without extra precaution the hills will be destroyed. The runners for setting should be taken as early as possible. They must be protected from the sun, and be kept in a cool, damp place until the day for setting. The English cluster hops are the best variety, as they ripen early, seed well, flour heavily, and are of richer quality than other varieties. After the ground is properly prepared, commence setting the roots. They should be cut midway between the joints, leaving two sets of eyes on each piece. In setting, take care that the rows are perfectly straight and uniform. The best method of setting the roots is to make holes with a stick or dibble, about seven inches in depth. In these holes put two or three "sets," with the "eyes" up, leaving the top ends on a level with the surface of the

ground. Then press gently around the roots soft and mellow earth, covering the top about one inch. This manner of setting is preferable to all others, as plants set thus will not be affected by drouth, as the lower ends of the sets, being deep, will soon take root and become strong, healthy vines.

FIRST YEAR'S CULTURE.—The best crops to cultivate with hops the first year are potatoes and corn, and of these two, potatoes are preferable, as they shade the young vines less. The hops should be hoed often enough to prevent the weeds from growing, and at the same time give strength and vigor to the vines. The ground should be kept as level as possible. Some time during September, each hill should receive a covering of half a bushel of well-rotted manure, which will keep the roots from being injured by the winter, and prepare them for yielding more abundantly the following year.

SECOND YEAR'S CULTURE.—As early in the spring as the frost disappears and the ground gets dry enough to work, the manure should be removed and the poles set, which should be done before the hops start. Collins's "horizontal stake and string yard" is highly approved by all who have tried it. It is seventy-five per cent cheaper than the long pole method. In using long poles, two are required to each hill from 20 to 25 feet long. The plow should be used after the poles are set and the manure removed from the hills. The first plowing should be turned from the hill, then with a hook loosen the soil around the roots, always removing the runners to within six inches of the hill. After the vines have grown about two feet long, four of the best are tied to each pole in the stake and string method, and two to each pole where long poles are used. Woolen yarn is used for tying, which should be done just below the second joint of the vine from the head; they must be tied loosely. The surplus vines should not be removed from the hill, but be laid down and covered. The tender vines are very easily wounded. The plow and hoe are not to be spared throughout the season, but the ground should be kept in a good state of cultivation. Hills must not be made, but the ground must be kept level, as described for the first year. About the first of June, a pint of compost, formed by mixing ashes, lime, plaster, and hen-manure, should be applied to each hill. This

will be valuable for strengthening the vines, and will free them from insects or worms.

PICKING.—The time for commencing the picking is to be determined by the hops; when the seeds are dark brown colored and hard, and the scales commence to loosen, they are ready for the harvesting. This usually takes place about the first of September. Hops are picked in boxes, which are generally divided into four compartments containing about ten bushels each. A man, called a box-tender, is required to attend the boxes. His duties are to bring the poles to the box; stack them after the picking; sack the hops, and see that they are properly picked. There should not be more than two hops on a stem, and they ought to be picked free from all stems or large leaves. After the boxes are full they are emptied into sacks, where they should not be left more than one or two hours; for, if they remain longer, they will commence to heat and color. In this way thousands of pounds are yearly injured.

DRYING.—After a sufficient quantity of hops are picked to spread over the surface of the kiln, from 12 to 15 inches thick, drying should commence—the sooner the better. Drying usually requires, by the method described, from four to six hours according to the thickness of the hops, the kiln being heated to about 150°. [The author here describes his patent kiln, but as it was already figured and described in Essay No. I., it is unnecessary to repeat it here.—Eds.] In drying,

the kiln must be properly and freely ventilated, both from beneath and above; when the steam begins to rise, a piece of brimstone, about the size of a hen's egg, should be burnt upon the furnace, and after the smoke disappears another is burned. This should be repeated several times whilst drying, for it will give the hops a rich, bright yellowish color. When the hops are frost-bitten, or otherwise injured, the amount of brimstone should be increased according to the amount of injury. After the steam begins to rise, a very uniform heat should be kept up, until the hops are nearly dry, when the heat should begin to slacken moderately until they are quite dry. The proper dryness is tested by examining the inside of the hop, which must be free from all its sap, and so dry that about one third of the stems will break when bent. In this state they should be removed to the storing-room. After drying, the hops should remain in the storing-room from three to four weeks before being baled. This gives them time to acquire a uniform moisture, which adds to their weight and quality. They must now be baled and made ready for market. In the fall, the vines are cut about six feet from the ground, to prevent the flow of sap, after which they are coiled upon the hills and covered with manure, as before described. The refuse vines are gathered into heaps and burned, and the plantations left to await the opening of another spring.

NO. IX.—BY JAMES WOOD, SARDONIA, ERIE CO., N. Y.

SOIL AND PLANTING.—I prefer a rich loam rather than a gravelly soil for growing hops, as the worms will not destroy the roots so badly as in a gravelly one—good corn-land is needed. After fertilizing and plowing, mark out the rows 7 × 8 feet. The outside rows should be 12 or 15 feet from the fence, to allow a double team, in plowing, to clear the outside row and then to come around and not disturb the hills next the plow. Sticks should be prepared in leisure or wet weather; one stick a foot long is needed for each hill, which will require about 700 for an acre. For the male hills, two sticks are required. By means of a line and measure, mark the places for the hills. The ground being marked with a stake showing the place of each hill, and two for each male hill, of which there should be five or six to an acre, we procure the

PLANTS.—Go to an old hop-yard and take the runners which come from the crown of the hill. Cut them in pieces of 5 or 6 inches in length, with two sets of eyes on each. Some consider that three bushels are enough for an acre, but I think four none too many. Plant the yard between the middle and last of April. One person takes an iron bar and another carries the sets. A hole is made with the bar each side of the stake which marks the hill, and the person with the sets puts two of them perpendicularly into each hole, and presses the earth well around them. In this way they stand the drouth better than if planted in any other manner. The male plants are set between the two sticks which mark the hills.

CULTIVATION.—I plant corn or potatoes—two hills between each two hills of hops, and a row between every two rows of hills. The ground is

to be kept clean through the summer by use of the hoe, and about the last of September a shovelful of manure is put upon each hill. I do not plant any thing in the yard after the first year. The following April, say about the 20th or 25th, I stick the poles. I do not care for a pole over 15 feet long, as we get more hops from them than when we use longer ones. I have had poles 25 feet long, but never found them profitable. The poles should be set in range, and on the same side of the hill all over the yard, as this much facilitates the plowing. It is well to have some hills in reserve in a convenient place outside of the yard, from which missing plants can be replaced. If a hill is destroyed by worms or any other cause, a root with its adhering earth can be taken from the reserve and set in its place. After the poles are stuck, and the vines are about a foot high, the yard must be plowed. Back-furrow about four furrows each way between the rows. When about two feet high the vines must be tied to the poles with old stocking yarn, or with wet oat-straw. In a few days they will cling to the poles without further tying. I have two poles to the hill, one on each side, and allow two vines to a pole. The surplus vines are twisted into a mass and placed upon the hill with a stone or clod upon them. The yard will need thorough cultivation all summer, and if any profit is expected, not a weed should escape the hoe and cultivator. [The author here describes his kiln, but as it does not essentially differ from those already illustrated in the other Essays, it is omitted.—Eds.]

PICKING.—Hop-boxes, in order to have them light to handle, should be made of $\frac{3}{4}$ -inch pine or basswood boards. Mine are 8 feet long by 3 wide and 2 deep, inside measurement. About 10 or 12 inches from the top of the box a strip six inches wide on each side runs the whole length, and projects far enough beyond the ends to serve for handles. The boxes have partitions dividing the inside into four equal parts, each of which will hold about 10 bushels of grain. Upon this box I put what hop-growers call a table. To make the table, saw boards about an inch longer than the width of the box, and enough of them to half cover it. Fasten these pieces together by means of a cleat six inches wide, nailed through its middle to their ends; this will leave a ledge projecting both above and below the surfaces of the table. Other cleats, not projecting below the lower surface of the table, are nailed to the other two sides, the whole

when finished forming a shallow box or tray, the ledge all round preventing the hops from being blown off, while those projecting below keep it in place on the box. Sacks will be required to carry the hops from the yard to the kiln. Cloth three yards long and one wide, will make a bag sufficiently large to hold the contents of one of the boxes. The time to commence picking is shown by the turning brown of the seed. In this locality, picking commences about the 25th of August, but it varies in different seasons. Pickers and box-tenders are engaged about two weeks before picking commences. The boxes are moved to the yard, and a crotched stick is driven into the ground within a few feet of each. They are placed in the middle of four rows, and the box-tender pulls the poles from the rows for four pickers. For three acres, I employed twelve girls as pickers and three boys or young men as box-tenders. It is best to have older men, as they will attend to their business and see that the hops are picked clean. In picking-time, all hands have their breakfast by candle-light, and are at work by the time there is sufficient daylight. The box-tenders are each charged to see that his own box is picked clean, and all coarse leaves and branches removed, and to allow no more than three hops in a cluster. The box-tender sets one end of the pole in the crotched sticks before mentioned, and pulls off the vines and lays them on the table which is over the box. Before taking up the poles, he should cut the vines as high up as he can reach. After the vines are removed, the poles are placed in convenient stacks, and the vines when dry are burned. When the boxes are full, the hops are put into the sacks, but not crowded, as there is then danger of heating. The sacks are taken to the kiln and left outside over night.

DRYING.—At sunrise, I empty the hops from the sacks on to the drying-floor, and spread them evenly by means of a rake. A good fire is made of dry, split wood, and at the end of an hour the steam will commence to rise, when I throw two handfuls of brimstone upon each stove. When the vapors of the brimstone have passed off, I start up the fire, and repeat the operation, and continue doing so until the hops are bleached. It usually takes me from sunrise until one o'clock to complete the bleaching. I then stir the hops with a rake and continue the fire, using larger wood, to make a slower fire and avoid scorching, which will readily happen when the hops are nearly dry. It requires judgment

and practice to dry hops properly. The hops are left on the kiln until cool, and are then removed to the store-room by means of a scraper. After a few batches are dried, I let them through the trap-door from the store-room to the base-

ment. The hops should not be in a mass more than two feet thick, and when there is a damp day they should be stirred to toughen them. Hops will be fit to press and may be baled at the end of two or three weeks after curing.

Method of Making Holes for Hop-Poles.

MR. AMOS TURNER, of Peru, Oxford county, Maine, communicates the following account of an implement



used by the hop-growers in his vicinity: "Instead of using a crowbar, we make holes for the poles with a pod-auger. The blade is of steel, and an old mill-saw is just the thing to make it of. Cut a piece of saw-plate 18 inches long, 2½ inches wide at one end and 6 inches wide at the other. This is to be bent so that a section of it will be semi-circular. A shank of ¾ inch iron and one foot long is riveted to the larger end of the blade, and it is furnished with a wooden handle in the same manner as a common auger. The engraving, Fig. 40, shows the shape of the implement. In using it, the auger is pressed into the soil by the foot, then, by turning it half-way round and lifting it, the dirt is brought out, and a hole made to receive the pole, with one half the labor of using a crowbar."

Description of Press.

THE drawings of the press noticed in the first essay, page 10, were not ready at the time that portion of the

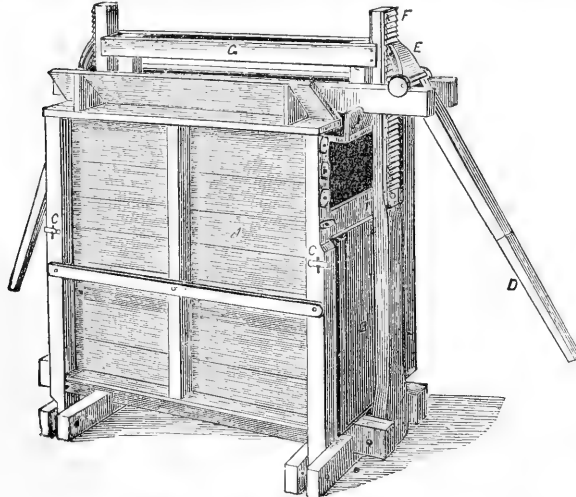


FIG. 41. THE HARRIS PRESS COMPLETE.

book was printed, and are appended here. The press is portable, and may be taken apart so as to pack in quite a small space. It stands upon a strong framework of timber, to which all other parts are attached.

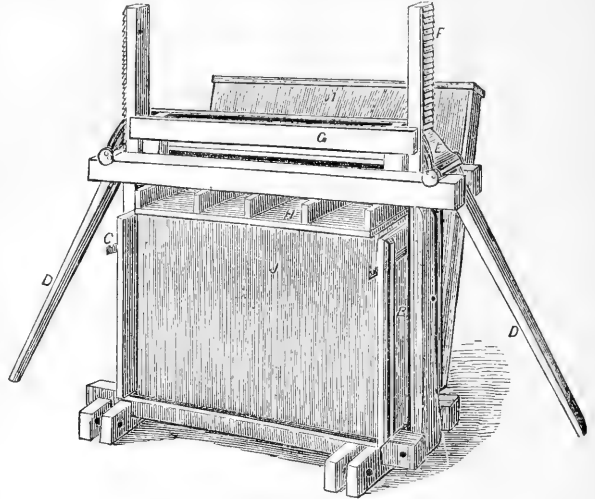


FIG. 42. THE PRESS WITH FRONT REMOVED.

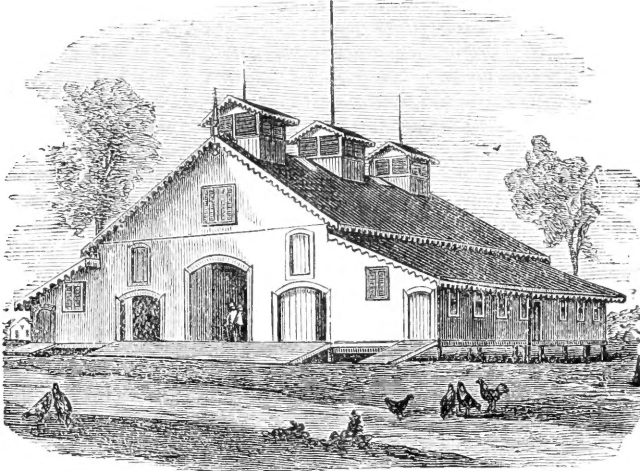
Fig. 41 shows the press complete. The sides, A, hook into the bed-frame in such a way as to be readily removed. They are held in place by means of a latch, C, which drops into a catch which is attached to the ends, B, and passes through the frame of the sides. The ends, B, are only about half the height of the sides, and the space above them is filled up by four movable pieces, secured by buttons, and which may be removed one at a time as the pressing proceeds. One of the pieces, I, is shown in place and the others removed. At the top of the press is a strong framework, G, upon the projecting ends of which work the levers, D, upon the ends of which is a pair of pawls, E, which work in the teeth, F, which are upon the face of two strong side-posts. The frame, G, presses upon a follower, H, Fig. 41. The action of the two pawls, E, is such that when the lever is worked in the manner of a pump-handle, they force down the frame, G, with great power. When the hops are pressed sufficiently, the sides and ends of the press may be removed by lifting the latches which hold them together, and the bale may be sewed. In Fig. 42 the press is shown with the front side removed and the rear side inclined backward, exposing the bale. The letters refer to the same parts in both engravings.

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